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Front Cover:

Graham Pizzey photographed the beautiful Little Egret shown this month. It may be seen near swamps or the edges of lakes, and is distributed fairly generally along the eastern part of Australia.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Here is the final note from Victor Jacobs describing places visited.

Lysterfield Reservoir

From the east road it was simple to walk on the bare lake margin from which the water had receded during the long dry spell. It was March 1967, and there were no squashy hummocks to retard our progress, and no close growing melaleucas and tangled blackberries to bar our movements. Instead, there was a firm, smooth, nearly dry mud shore, carpeted by the desiccated remains of water weed. With our backs to the lake margin we could see, at eye level on the marginal melaleucas, a wide high-level marker band of this same water weed.

There were many aquatic birds, but suspicious and cautious in mood as they anticipated our movements; and they kept their distance whether on the open water or beside the margin. The following were recorded:

90 to 100 Coots, 12 Black Ducks, 1 male Musk Duck, 2 White-faced Herons with a young one, 1 White Egret fishing, 3 Spur-winged Plovers, many Eastern Swamp Hens (flushed from the scrub bordering the water), 1 adult Crested Grebe shepherding three young ones across the water, and 12 Black Swans.

A Reed Warbler attracted us, not by its usual dynamic song but by flitting among the dry stems of the Reed Mace. Another joined it and they busied themselves hunting insects. They will probably soon migrate to their winter haunts.

Small birds coming from the marginal scrub, to fossick in the reeds, was a party of Blue Wrens.

Even though our walk had been facilitated by the open shore, a constant north wind left us a little weary, so lunch was taken in a shady spot.

We left the lake for our return journey. We pushed through the melaleuca belt, past the Red Gums (looking as unhappy in the dry as they had done in the wet), on to the slope where the Mahogany Gums looked healthy, and into a grove of venerable Narrow-leaved Peppermints. Here a young Crimson Rosella called, while a White-eared Honeyeater shared his tree. An inordinately loud rustling was caused by a pair of Blackbirds scouring the dry Mahogany Gum leaves that carpeted the forest floor. Where a Mahogany Gum branch had been pulled away from the trunk, a mass of gum had exuded. Two Grey-backed Silvereyes were pulling at and eating pieces of this gum. One flew off while the other remained. This bird had unusual markings—white patches on upper rump, wing tip and neck, plus a pink lateral stripe.

A handsome Golden Whistler in immaculate plumage called and was answered by his mate. Here too we saw a grey Thrush, a Yellow Robin and a small flock of White-naped Honeyeaters.

* * *

Having used my jottings to compile this series of short articles, I feel that I have overtaken unfinished business. It was not too difficult once the first words had been written. I hope sincerely that many other members will be able to follow suit; and thus use the *Victorian Naturalist* in a manner which is their right—a medium for the publishing of their observations in natural history.

Subscriptions Now Due

The Field Naturalists Club of Victoria is administered by a relatively small number of honorary office-bearers.

The growth of the club and the expansion of its activities, particularly in connection with the production of the *Victorian Naturalist*, are continually adding to the burden of work.

It is therefore requested that fees and subscriptions be paid as promptly as possible, in order to help lighten some of this burden. The financial year commences on the 1st January, 1969.

If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post, using the form provided on the reverse side of this leaf.

This procedure will save office-bearers' time, and expense, in sending out reminder notices.

PLEASE ATTEND TO THIS MATTER NOW

You may help further by passing the following leaf on to an acquaintance who is not a member of the F.N.C.V. or a subscriber to the *Victorian Naturalist* but who might be interested in either.

NOTES:

1. Membership fees for the year 1969 are as follows:

Ordinary Members	$7.00
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Junior Members	$2.00
Junior Members receiving *The Victorian Naturalist*	$4.00
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Affiliated Societies	$7.00
Life Membership (reduction after 20 years membership)	$140.00

(Ordinary, and country members receive the *Victorian Naturalist* free of any further charge.)

2. The scheme of supporting membership was introduced so that those who are able and willing to do so might help club finances. You are invited to become a supporting member by making a voluntary addition to the normal annual fee of any sum you choose, from $1 upward. Details relating to supporting members and their payments are regarded by the treasurer as confidential, and no distinction or extra privilege is bestowed on the members concerned.

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Field Naturalists Club of Victoria

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Yours faithfully,

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Book Review

Night Watchmen of Bush and Plain

by DAVID FLEAY

Published by Jacaranda Press Pty. Ltd. Brisbane

10" x 7", 163 pages. 17 colour and 99 half-tone plates, with Distribution Maps of Australian Hawk Owls inside front and back covers. Printed on high quality paper, with stiff cover and full colour dust-jacket. Price $5.50.

Beginning with his early teenage years in 1923 when a vocation in pharmacy appeared about to be thrust upon him; and culminating with the first breeding in captivity of the Powerful Owl in July 1968, is the subject to which David Fleay devotes the first five chapters of this book.

Written in his usual easy style, and dotted with humour, the author is able to convey to the reader his feelings as he was taken on his first trip to camp in the forests which lay within the triangle formed by the towns of Ballan, Blackwood and Daylesford.

Here, deep in the Korweingeboora forest, began the prelude to forty-two years of patient and painstaking study of the Powerful Owl.

In succeeding chapters, the reader tramps with the author over miles of rugged country; and spends both pleasant nights and nights of being cold, wet, muddy and miserable. But always there is an expectancy that the roosting site of the Powerful Owl is near. Right through these first five chapters, the reader is constantly aware of David Fleay's unflagging patience and determination to eventually breed captively, this wonderful and lordly bird.

In the remaining pages of the book, the reader is introduced to other species of owl including the Rufous Owl of the rain forests in northern Australia, the Barking Owl, the Boobook Owl, the Masked and Barn Owls, the long legged Grass Owl and the Sooty Owl. To complete the book, chapter thirteen is devoted to the Frogmouth and Nightjars.

Indeed, for this reviewer, *Nightwatchmen of Bush and Plain* has been one of the most impressive publications on natural history during 1968. It is well written and illustrated, is authoritative in its text, and at the same time is able to be read and enjoyed by all age groups.

To quote from the author's introduction:

> . . . . Along the moonpaths and under the stars, in fact, there is a world of intense and abiding interest known to few but open to all.
>
> Be proud of things characteristically Australian, and do make sure for the sake of the future that children in particular treat them with the respect they deserve.

G.M.W.

Ecological Valence of Mountain Ash (*Eucalyptus regnans* F. Muell.) as a key to its distribution

G. Ross Cochrane*†

Abstract

The objective of this study was to test the hypothesis that, "knowing the environmental conditions necessary for the growth of a stenovalent species like mountain ash (*Eucalyptus regnans* F. Muell.) its distribution could be mapped accurately from analysis of the environment". If successful this could prove a relatively rapid method for mapping mountain ash vegetation.

Tests were carried out in the Dandenong Range in Victoria immediately after bushfires in January, 1962, made access, rapid traverses, and accurate identification of forest trees possible.

Further identification and measurement of environmental factors, particularly precipitation, temperature, insolation, cloud cover, wind velocity and direction, and soil depth, texture, and moisture were continued until mid-1965.

Distribution of *E. regnans* was checked against environmental conditions and the narrow ecological valence of this species showed it to be a useful indicator plant of a narrow set of habitat conditions.

The tested hypothesis was used to amend an earlier distribution map of *E. regnans* and other species in the Dandenong Range. The hypothesis was further tested, in 1964 and 1965, on a larger scale to determine distribution of mountain ash and other Eucalypts in the Otway Ranges, a rugged area of difficult access in Southern Victoria.

Field evidence in both the Dandenong and Otway Ranges supports the hypothesis that mountain ash occurs naturally wherever a narrow set of environmental conditions is present. These conditions include a moist environment with annual mean precipitation over 120 cm, absence of long periods of water stress, shelter from both strong cold and strong hot winds, free air drainage, and moist, deep, well-drained soils. The altitudinal range of the species is between 225-1300 m. Its narrow ecological tolerance proves to be a useful indicator of its expected distribution, not only for broad regional studies but also for recognizing smaller local patterns.

* Geography Department, University of Auckland, New Zealand

† Presented to the Botany Section of the 39th Conference for the Australian and New Zealand Association for the Advancement of Science, Melbourne, Australia, January 1967.

Introduction

Diversity of habitat in most forests and woodlands in Australia is characterized by different species of *Eucalyptus*, and only *Eucalyptus*, as the tree dominants. There is also a high degree of uniformity of morphology in this genus. In other continents over a comparable environmental range different genera, families, and even broader systematic groupings—as well as life-form differences—are characteristic of the tree component of forest and woodland communities.

Within the apparent uniformity of *Eucalyptus* vegetation large numbers of species are present (Blakely 1955; Wood 1959) and, wide variations in ecological valence occur (Pryor 1959). Some species tolerate a wide range of environmental conditions, others are intolerant of changes even to the micro-habitat. The latter plants are good indicators of specific micro-habitats. Broad ecological studies (Herbert 1929; Patton 1930; Carter 1946; Clifford 1953; Jacobs 1955; Gilbert 1958) and detailed autecological investigations (Powles 1937, 1940; Carr 1954; Ashton 1956, 1958; Cunningham 1957, 1960; and Teller 1957) show mountain ash (*Eucalyptus regnans* F. Muell.) to be stenovalent (i.e. to have a narrow ecological tolerance).

Mountain ash forests are found only

in Victoria and Tasmania, in relatively restricted areas where a narrow range of environmental conditions occur that favour their growth. When these conditions are understood it should be possible to find mountain ash whenever the set of conditions is repeated. In this study this hypothesis was investigated for areas in the Dandenong Range, near Melbourne, and in the Otway Ranges in Southern Victoria, and the distribution of mountain ash verified. An earlier map by Clifford (1953) showing distribution of *Eucalyptus regnans* in the Dandenong Range is amended.

Physical Characteristics

The Dandenong Range near Melbourne is an irregularly triangular-shaped range eight miles wide along its southern west-east aligned base and some eight miles in length along its main northeast-southwest axis. This upland area of largely dacite rocks (Morris 1913; Edwards 1955) rises steeply from the coastal lowlands to the west but is less steep on its southeastern and eastern flanks. It reaches a maximum height of over 600 m at Mount Dandenong and at Burkes Lookout in the narrower northern apex. Average height of the divide is 540 m in the north and west and about 100 m lower in the south (Figure 1).

A broad central upland area of several square kilometres in area centered on Sherbrooke and containing the Sherbrooke Forest mountain ash reserve is a gently to moderately sloping area of deep krasnozem soils. Elsewhere shallower krasnozems and podzols occur similar to soils recorded in adjacent areas by Holmes, Leeper and Nicolls (1940). Skeletal soils are associated chiefly with toscanite outcrops on the lower western slopes of the Dandenong Range, but they also occur elsewhere. Mountain ash occurs only on the deep krasnozem soils.

The deeply dissected Otway Ranges in southern Victoria are much more extensive in area and are more heavily forested though not much higher in elevation than the Dandenong Range. Both areas have a humid, mesothermal (Koppen Cfb) climate. Mean annual rainfall, which varies from 90-125 cm in the latter range, is over 250 cm in the wettest coastal uplands of the deeply dissected, tilted, Jurassic sandstones, shales and siltstones of the Otways. In both areas rainfall increases from about 90 cm at 150 m to maximum values on windward upper slopes near 600 m elevation. Also temperatures are cooler, humidity higher, cloudiness greater, mists more frequent and rainfall effectiveness enhanced with increase in elevation. This parallels conditions recorded in the Mount Lofty Ranges in South Australia (Cochrane 1963). The main rain-bearing winds are from the south while strong, dessicating winds are chiefly from the north and west. These variations in climate with increasing altitude and with different aspects are reflected in the dominant tree associations (Cochrane 1968a).

Methods

Immediately following the disastrous bushfires of January 14-17, 1962, in the Dandenong Range, a field programme investigating (a) the area and degree of fire damage, (b) the distribution of Eucalypt tree species, and (c) the patterns of regeneration of trees and of understorey seral vegetation was initiated and continued at regular and frequent intervals until June, 1965. The influences of relief, aspect, insolation, precipitation, cloud cover, temperature, wind velocity and soil texture and soil moisture were observed to determine their effects upon vegetation distribution and regeneration.

Initially, whilst the areas were free

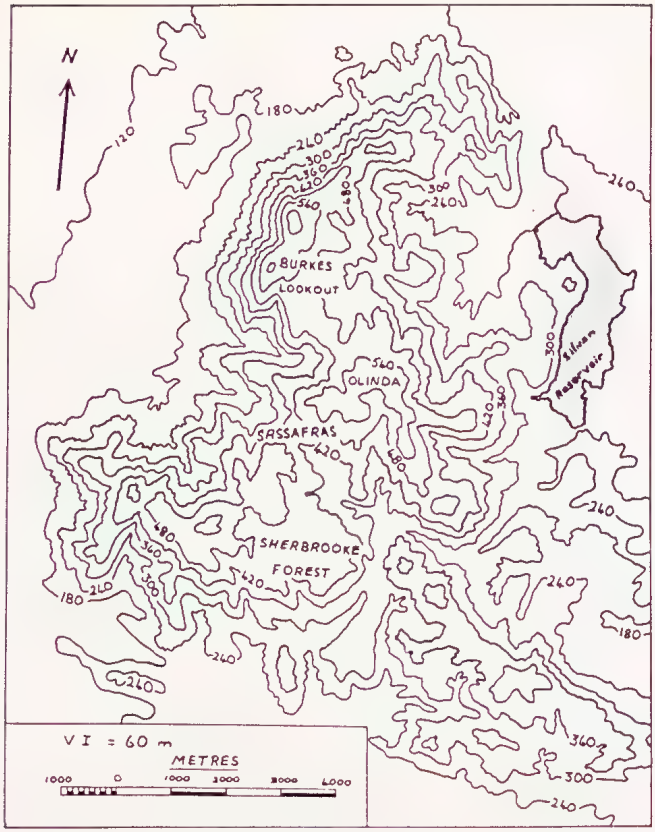

Figure 1

of undergrowth thereby allowing easy movement, a series of rapid traverses was carried out at 900 m intervals corresponding with the grid lines of the Victorian 1 : 50,000 Monbulk Sheet. This was soon modified to include traverses along ridges, crests, and valleys and around the contours at 150 m intervals. Maps at the scale of 1 : 7920 (1 inch to 10 chains) of the Dandenong Series and vertical air photographs at a similar scale, flown immediately after the bushfires, were used as base maps in all the later investigations.

Permanent quadrats, each of 100 m^2 (10 m on a side), were set up under different *Eucalyptus* tree communities and as the regenerating undergrowth vegetation became more dense, quadrats of 16 m^2 (each 4 m on a side) were used to record the characteristics of the understorey species.

Temperatures were recorded from a series of maximum-minimum thermometers, wind velocities from spot anemometers, and altitude of cloud base from a surveying aneroid altimeter. Other climatological information was interpolated from stations closest to the survey areas.

Soils were analyzed in the field for structure, depth, texture, pH, and moisture content at quadrat sites.

To further test the patterns that were recognized in the Dandenong Range detailed transects were recorded in the Otway Ranges during 1964 and 1965 in forest regenerated areas burned during the calamitous, virtually State-wide 1939 bushfires, and also in

areas that appeared to have escaped burning during the last 100 years. In addition to recording all plant species along the transects, the physical properties of the soil and the pH were tested at regular intervals within vegetation communities as well as at every break of slope and at each change of vegetation on a range of different aspects. These ground control transects were used for wider mapping from vertical air photographs.

Results

Several factors soon became obvious, however, only the first two factors noted will be discussed in this paper although the other factors are all directly or indirectly significant in the plant-environment interrelationships observed.

Firstly, field mapping showed anomalies in the dominant tree species distribution described by Clifford (1953). Secondly, the distribution of *Eucalyptus* species was closely linked to habitat. Thirdly, distribution of bracken, *Pteridium esculentum,* a rapid and aggressive initial colonizer of bare, forest-fired areas was closely related to precipitation totals and soil depth. It formed an important nursery cover for later species in the pyrosere. Fourthly, tree dominants, all of which were Eucalypts, displayed distinct regeneration patterns which varied with each different species (Cochrane 1966). Fifthly, regeneration patterns of understorey species were influenced by the canopy cover of the tree dominants (Cochrane 1968b). Recent investigations by Webb *et al.* (1967) also recognized the importance of canopy in the structure of Australian rainforests.

Discussion

The present author experienced more favourable circumstances for field investigations than were available to Clifford ten years earlier. The advantages included (1) relatively free access over difficult country for a few months when all the undergrowth had been razed by the January, 1962, bushfire (Figure 2). Clifford had been confined to roads and tracks with problems of identification when peering into dense stands, especially of tall clean-barked trees which could be one of several species. Also the dense undergrowth which was present when Clifford mapped the area, frequently masked lower trunks, retarded progress, and made it difficult to recognize shape and size of *Eucalyptus* leaves which were commonly 50 m above the ground. (2) Positive identification of tree species was possible from leaf defoliation caused by radiant heat from the forest-fire understorey fuel. Leaves carpeting the fire-cleared ground shortly after the bushfire facilitated exact identification even of individual trees. (3) Distribution patterns were confirmed later from the study of juvenile leaves when regeneration of *Eucalyptus* trees began three to six months after the fire.(4) Large scale, 1 : 7920, Dandenong Series maps were available for base maps along with 1961 and 1962 vertical air photographs of a similar scale. Clifford had to work with much less accurate base maps.

However, although he plotted his distributions on a small scale map where it was difficult to define exact boundaries, he also prepared a large scale relief model of the Dandenong Range and showed distribution of *Eucalyptus* species on this.

The most obvious differences observed between the present writer's field mapping and the pattern mapped by Clifford (1953) was in the distribution of two species, mountain ash (*Eucalyptus regnans*) and mountain grey gum, *E. goniocalyx.* Clifford's

Figure 2

map showed that there was a significant observable relationship between the distribution of *Eucalyptus* species and the topography in the Dandenong Range. In effect these distribution patterns resulted primarily from differences in aspect and rainfall totals with wet sclerophyll forest associations found on the moister, cooler, eastern and southern lee slopes and dry sclerophyll forest associations occurring on the drier, warmer, western flanks which were more exposed to insolation and strong dry winds.

Wet sclerophyll forest of almost pure stands of very tall (over 70 m) mountain ash was mapped by Clifford as occurring essentially on the eastern flank of the approximately northeast-southwest aligned main range in areas with 122 cm or more annual average rainfall and lower evaporation than on the western slopes. He also recognized their presence on southern slopes, between Sherbrooke and Belgrave, sheltered by land configuration from western and northern winds (Figure 3). Two very small localized areas in sheltered sites near roads were also mapped on the western flanks, west of Sassafras. Another wet sclerophyll forest tree, mountain grey gum, occurred chiefly at lower elevations than mountain ash in areas with less than 122 cm precipitation essentially on the sheltered eastern lee where it was free from the frequent, high-velocity, dessicating northerly and north-westerly winds present on the westerly flank of the range. It also occurs on the western and northern slopes mainly in moist sheltered valleys in combination with species of the dry sclerophyll forest (Figure 2).

On the western and northern flanks dry sclerophyll forest associations of stringybarks (*E. obliqua, E. macrorrhyncha, E. baxteri*), box (*E. elaeophora, E. melliodora*), and peppermint (*E. radiata*) prevail with lesser

continued on p. 19

A New Species of Ray of the Genus *Urolophus* (Elasmobranchii : Urolophidae) from Victoria

by Joan M. Dixon*

Summary

A new species of ray, *Urolophus paucimaculatus* from Victorian waters is recorded and described. Some observations are made on the distribution and breeding of this species.

Introduction

On 2nd May, 1967, the author collected a number of ichthyological specimens in Westernport Bay, Victoria and, amongst the sample of urolophids, found specimens which could not be identified. The most distinctive features of these were the presence of a few white spots on the upper surface of the disc, and the unusual arrangement of the nasal apparatus. From a search of the literature, it appeared that this was indeed a new species, and attempts were made to gather additional material. A number of specimens were collected, and material already held in the collections of the National Museum of Victoria was examined.

Materials and Methods

Specimens were collected by various methods, some by hand, some by trawling and others were netted. They were fixed for a few days in 10% formalin, then washed and stored in 70% alcohol.

The description of the species is based on National Museum of Victoria registered specimens, A 334 holotype and A 335-A 349 paratypes. Specimens R 13351-R 13356 and A 350 were examined. Measurements made on the type series are based mainly on the methods of Hubbs and Ishiyama (1968). They are point to point determinations and are measured in millimetres.

Systematic Account

Class—Elasmobranchii

Family—Urolophidae

Genus *Urolophus* Müller and Henle, 1837

Ber. Verh. K. Pr. Akad. Wiss. Berlin, 1836 (1837), p. 117

Type species, *Raja cruciata* Lacépède

Urolophus paucimaculatus sp. nov.

Plates I-III, Table I

Material. Holotype: Male, total length 366 mm., National Museum of Victoria registration No. A 334, collected by A. O. Yateman in a 6″ strand monofilament net in 40 fathoms in Bass Strait, approximately 13 miles off Cape Patton, Victoria, 28th September, 1968.

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Paratypes: 8 females and 6 males, National Museum of Victoria reg. nos. A 335-A 349 as follows:

A 335 male, t.l. 338 mm. netted in 40 fathoms off Cape Patton 28th September, 1968, coll. by A. O. Yateman.

A 336 male, t.l.	385 mm.	
A 337 female, t.l.	463 mm.	
A 338 female, t.l.	142 mm.	Young of A 337
A 339 male, t.l.	138 mm.	
A 340 male, t.l.	130 mm.	
A 341 male, t.l.	133 mm.	
A 342 female, t.l.	135 mm.	
A 343 female, t.l.	133 mm.	

Netted in 20 fathoms, 5 miles south-east of Zeally Point, Torquay, Victoria, 6th October, 1968, by A. O. Yateman.

A 344 female, t.l.	308 mm.	
A 345 female, t.l.	330 mm.	
A 346 male, t.l.	111 mm.	Young of A 345
A 347 male, t.l.	102 mm.	

Collected in otter trawl in 2 fathoms, in Hann's Inlet, between Sandy Point and Tortoise Head, Westernport Bay, Victoria, from Fisheries and Wildlife boat "Caprella", 2nd May, 1967 by J. M. Dixon.

A 348 male, t.l. 358 mm. Collected (by hand) off Kirk Pt. Port Phillip Bay, Vict. 1st October, 1967 by T. Muir.

A 349 male, t.l. 353 mm. Collected in 3 fathoms off Torquay, Vict. 19th July, 1968 by R. Milliken.

Other material examined. Nat. Mus. Vict. specimens reg. nos. R 13351-R 13356 from Fisherman's Bend, Vict. 2nd May, 1932, and A 350 from west of Lakes Entrance, Vic. 17th March, 1948. Coll. by A. Dunbavin Butcher.

Diagnosis. This species is most easily distinguished from other urolophids by the presence of a few small white spots on the upper surface of the disc, and by the shape and arrangement of the nasal apparatus. (Plates I-III).

Description. (For measurements of holotype, see Table I).

Disc broader than long, anterior lateral margins slightly angled, posterior border rounded. Snout produced into small sub-acute rostrum, behind it occur numerous dorsal pores. Distance between snout and mid-cloaca slightly exceeds distance from mid-cloaca to end of tail.

Tail dorso-ventrally flattened, stout at base; tapers gradually into spatulate, rounded caudal fin. Prominent lateral ridge arises just behind base of tail, becomes most evident half way along length of tail and obscure at about level of caudal spine. Spine stout, well defined, covered with skin in young specimens, bears 17-25 backwardly directed, slightly curved narrow teeth in older specimens. Pelvic fins widen gradually from insertion to rounded lateral margins, moderately acute on inner posterior border. No dorsal fin.

Orbits raised conspicuously above level of disc.

Spiracles roughly triangular, wider

behind than in front, anterior edge almost level with front of eye, posterior edge curves medially around hinder rim of orbit.

Nasal curtain in shape of a broad bell. Rounded antero-lateral margins almost fill nostril when depressed. Lobes of curtain asymmetrical, right lobe closes nostril more completely than left. Postero-lateral edges extended into small rounded processes projecting beyond hind border of curtain. Frenum mildly fimbriate, left and right sides divided by median notch at junction with nasal septum. Postero-lateral margin of nostril has characteristic inwardly directed prominence. Cavity of nostril bordered at rear by fleshy lobe which accommodates expansion of nasal curtain.

Mouth has small labial folds, lower lip shows a median shallow depression; skin behind lower lip pleated into several longitudinal folds.

Papillate maxillary velum in throat. Inside mouth, behind lower lip lies a series of small buccal processes which may divide into about six club-shaped extremities.

Teeth showing sexual dimorphism. Male with two distinct tooth types, undifferentiated, flat rhomboidal ones laterally, and sharp semi-triangular backwardly pointed ones towards mid line in both jaws. In females, teeth regularly arranged, rhomboidal, pavement-like with small transverse keels having slight backwardly projecting tips.

Colour. (Described from freshly preserved specimens). Disc grey-brown above, whitish grey below, edges of disc darker. A conspicuous U-shaped brown band between eyes just behind spiracle extends anteriorly around inner margin of orbit on each side, then posteriorly along outer margin. Upper surface of disc usually patterned with a few regularly arranged small white spots encircled by dark border.

In the type series the number of spots ranges from 0 (in three juveniles) to 9. Some spots spherical, others dumb-bell shaped. Position variable, usually in pairs in linear series; a single spot may occur between eyes, and any one of a pair may be absent.

Caudal fin darker than body of tail.

Iris of eye golden orange.

Dorsal spine translucent-white in adults, tinged with yellow in juveniles.

The above description is based on the specimens of the type series, both males and females. The holotype, A 334, a male, is distinguished by its spot pattern, one pair outside and almost level with front of eyes, a single spot between the eyes, one on left side behind the eye and a pair posterior to this.

Distribution. From material and records available the known range of *U. paucimaculatus* is from Portland, through Bass Strait, to a distance of 13 m. off the Victorian coast, into Port Phillip Bay, Westernport Bay, and off the Victorian coast at Lakes Entrance. The species is found in depths varying from 2-40 fathoms.

Breeding information. Specimens with young have been recorded on three occasions. One of the Westernport Bay specimens, A 345, gave birth prematurely to two young on 2nd May, 1967. In July of that year, Mr. B. Carthew of Portland sent in to the Museum a photograph of a female with four juveniles. On 6th October, 1968, A 337, taken from Zeally Pt., Torquay, produced six well formed young.

Affinities. The species *Urolophus paucimaculatus* is easily distinguished from the other Australian urolophids. Its spotted disc links it with such forms as *U. gigas, U. circularis* and

U. bucculentus; however, in both the number and arrangement of spots it can be distinguished from these species. There appear to be affinities with *U. viridis* and *U. lobatus*. In the former species, the greenish colour of the body and the absence of the small inwardly directed prominence on the hinder border of each nostril enable clear distinction from *U. paucimaculatus*. The conspicuous tentacle on the outer margin of the nostril in *U. lobatus* does not occur in *U. paucimaculatus*.

Acknowledgments. Thanks are due to the numerous collectors in the abovementioned paper, for their most valuable assistance in helping to provide a range of material; to Mr. G. P. Whitley for help in the initial stages of the work, and to Mr. F. Guy of the Royal Melbourne Institute of Technology for the photographs.

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TABLE I

Dimensions of Holotype A 334, in millimetres

Measurement No.	Part measured	Definition of part	Dimension in mm.
1	Total length	From snout top to caudal fin tip	366
2	Disc width	At maximum pectoral spread	235
3	Disc length (a)	Snout to posterior margin of pectoral fin.	205
4	Disc length (b)	Snout to inner pectoral margin	186
5	Snout-cloaca	Snout tip to cloaca centre	187
6	Tail length	Cloaca centre to tip of caudal fin	174
7	Tail width	Maximum, at insertion	20·5
8	Tail lateral fold	Anterior to posterior limits	70·8
9	Pelvic fin width	Maximum, each fin from posterior margin of cloaca	43·9
10	Pelvic fin length	From lateral insertion to inner posterior limit	52·4
11	Caudal fin	Maximum height	16·5
12	Preocular length	Snout tip to anterior margin of eyeball	52·8
13	Preoral length	Snout tip to mouth slit	50·1
14	Prenarial length	Snout to anterior rim of nostril	38·0
15	Internarial distance	Minimum separation of nostrils, at sides of nasal curtain	15·6
16	Nasal curtain—length	From front rim of nostril to posterior limit of curtain	12·9
17	Nasal curtain—width	Posterior width, left or right lobe	13·3
18	Mouth width	Between inner borders of lips	22·5
19	Eyeball length	Excluding surrounding tisue	12·1
20	Interorbital distance	Minimum, between inner-margins of orbits	31·5
21	Interspiracular distance	Minimum, between inner-most border of spiracles	31·4
22	Spiracle length	Maximum from front to rear rim	17·3
23	Distance between gill slits	Between lateral extremities	
	1st pair		57·5
	2nd pair		54·4
	3rd pair		51·3
	4th pair		46·1
	5th pair		37·1
24	Snout to gill slits	To outer edge of gill slits	
	1st pair		84·2
	2nd pair		90·5
	3rd pair		98·2
	4th pair		103·2
	5th pair		107·0
25	Clasper length	Lateral, to pelvic fin junction	13·5
26	Tail spine length	From base posteriorly, to apex	35·4
27	Tail spines—number	All visible and clearly defined spines	25

Plate I

Urolophus paucimaculatus sp. nov. Holotype, A 334, male, total length 366 mm., dorsal aspect

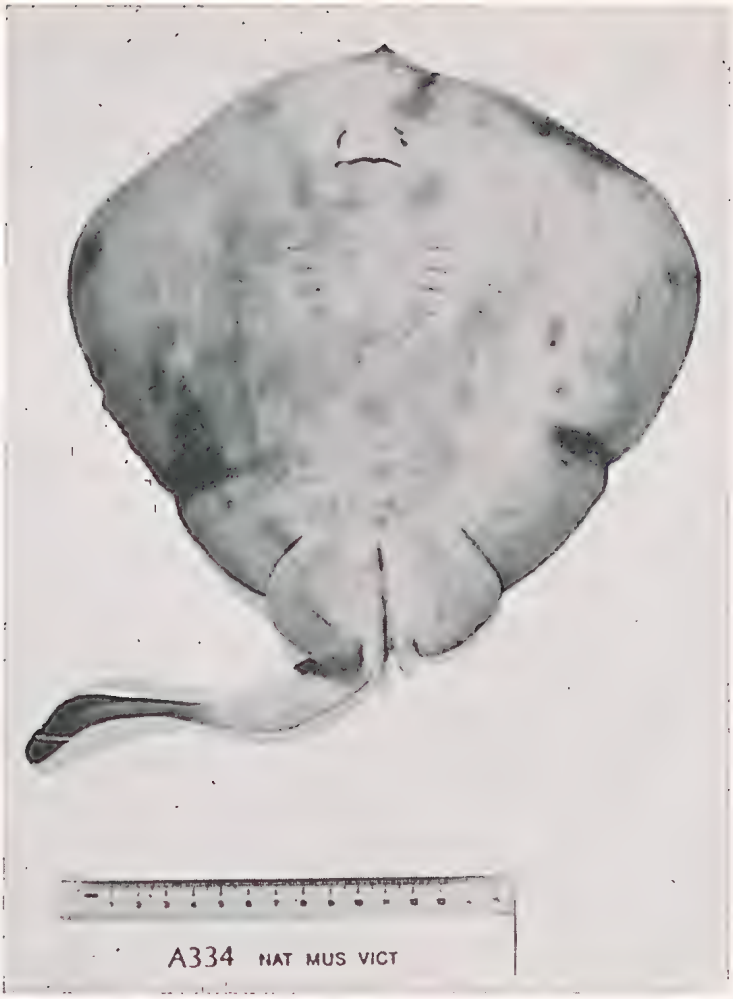

Plate II

Urolophus paucimaculatus sp. nov. Holotype, A 334, male, total length 366 mm., ventral aspect.

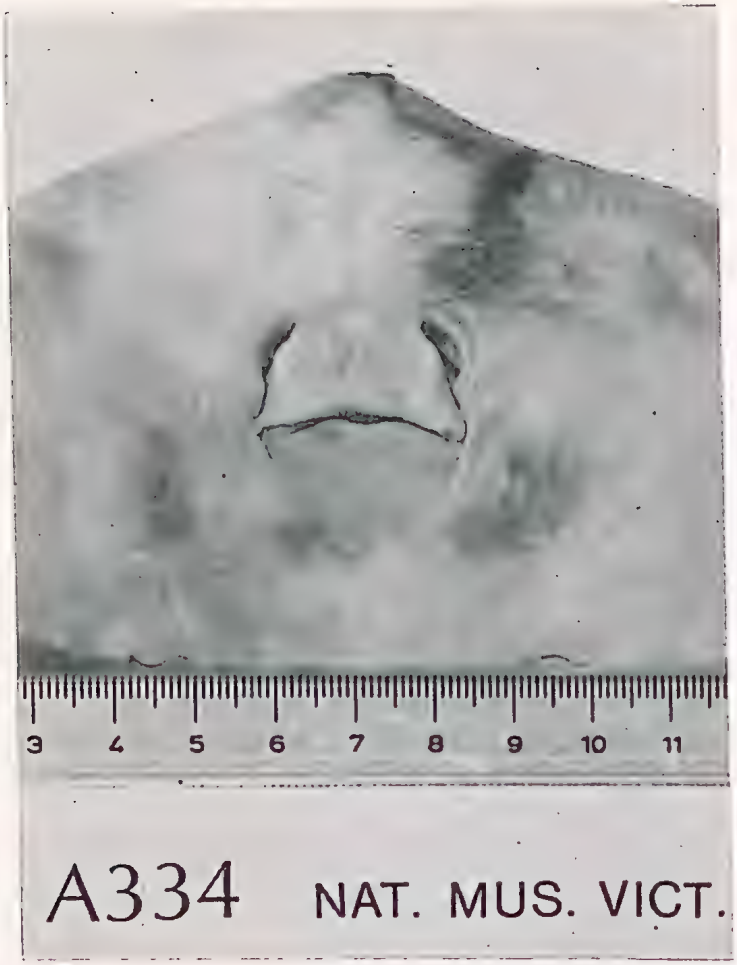

Plate III

Urolophus paucimaculatus sp. nov. Holotype, A 334, male, total length 366 mm., ventral aspect showing nasal apparatus.

continued from p. 10

species present in restricted sites and swamp gum (*E. ovata*) localized along stream courses.

Clifford's field observations showed that distribution was essentially dry sclerophyll forest on western slopes and wet sclerophyll forest on the sheltered eastern flanks. Although he recognized this major division between western and eastern slopes and in the south in the Sherbrooke Forest area, he failed to apply the same principle on a smaller scale, relating local climate (relief, aspect, exposure) uniformly to vegetation. Thus, on the eastern flanks both mountain grey gum and messmate, *E. obliqua*, are found well within Clifford's mountain ash region on areas that are relatively exposed to the north. Similar irregularities in distribution are present on the western slopes when wet sclerophyll species occur in favourable localities within the prevailing dry sclerophyll communities.

Field surveys during 1962-65 showed that within the 122 cm isohyet variations in temperature, insolation, cloud cover and windiness, chiefly resulting from differences in aspect and exposure, and changes in soil characteristics, especially soil type (krasnozem, podzol or skeletal), soil depth, and soil moisture retentivity were the chief controlling factors in species distribution (Tables 1 and 2).

Differences in actual distribution from that mapped earlier by Clifford were even more marked on the western flanks. This was especially the case in the basin where the tributaries of the upper reaches of the Dandenong

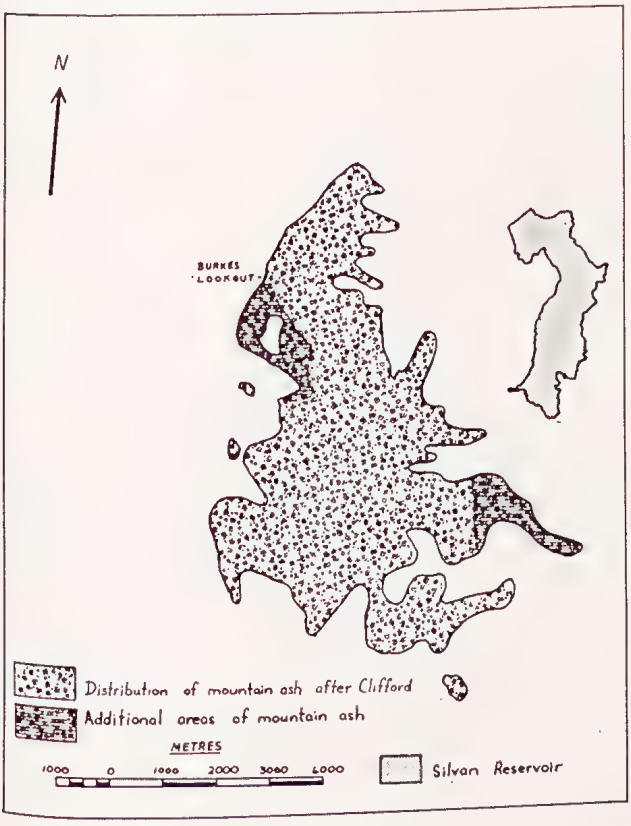

Figure 3

TABLE 1

Average temperature range, vegetation, soils, and cloud base for sites within the 120 cm annual average isohyet on the Dandenong Range near Burkes Lookout (temperature C°).

Month	N face	Station W face	Crest, just over S lee	S face
Dec (Summer)	45·8	46·6	34·8	24·4
Mar	33·9	35	19·5	16·7
June (Winter)	8·9	9·7	6·7	3·1
Sept	26·7	23·9	19·5	15
Vegetation	*Eucalyptus radiata* *E. obliqua*	*E. radiata* *E. obliqua*	*E. goniocalyx* *E. obliqua*	*E. regnans*
Soils:				
Krasnozem	,,	,,	*E. goniocalyx*	*E. regnans*
Podzols & Skeletals	,,	,,	*E. obliqua*	*E. goniocalyx*
Alluvial	—	—	*E. viminalis*	*E. viminalis*
Wet soil	—	—		*E. ovata*
Cloud base:				
Winter	Usually above 900 m	Usually above 900 m	Occasionally below 300 m	Commonly below 300 m
Summer	Usually above 900 m	Usually above 900 m	Usually above 700 m	Frequently below 300 m

Creek drain the western flanks of the Range. Although mapped by Clifford as supporting dry sclerophyll forest of messmate and narrow-leaf peppermint (*E. radiata*), with some mountain grey gum, this area chiefly supported mountain ash. Other species combinations replaced mountain ash on aspects open to the west or north.

What do the observed differences in patterns of distribution of mountain ash imply? It is well known that *E. regnans* usually occurs as a single species, even-aged stand and has a very narrow ecological tolerance. As was noted earlier this has been documented by various workers. Work on the synecology (Ferguson 1957) and the autecology of the species, and particularly studies of seedlings under both field and glasshouse laboratory conditions by Drangsholt (1956), Cunningham (1960) and Ashton (1956) have established certain critical limits for mountain ash. Broadly these involve moist conditions with annual average rainfall over 120 cm, absence of a long period of water stress, deep, well, but not excessively drained soils, shelter from drying winds and free air drainage because of frost intolerance of mountain ash seedlings. Cool temperatures do not appear limiting as the altitudinal range of the species is between 225-1,300 m, although it grows best between 450-1,050 m elevation.

Recognizing that habitat conditions favoring mountain ash were generally absent on the western flanks of the Dandenong Range, Clifford mapped all *E. regnans* as occurring east of the main divide with the exception of two very small areas west of Sassafras, where road access was good. Field investigations by the present writer showed that physical conditions supporting magnificent mountain ash forest in Sherbrooke Forest are not dissimilar from those in the burned catchment area of the upper Dandenong Creek in the southern lee of Burkes Lookout. In addition, conditions are similar to those present in

the two very small areas on the western flank, which were mapped by Clifford as supporting mountain ash.

Field evidence fully supported the belief that mountain ash had also been present in this area prior to the bushfire of Jaunary, 1962. (1) Leaves of mountain ash were found beneath fire-killed trees. (2) Nine months after the bushfire the trees remained starkly gaunt, bare and bleached whereas all trees other than mountain ash had regenerated green juvenile foliage from dormant, epicormic, adventitious shoots. This tallied with the known distribution of mountain ash on the eastern flanks where mountain ash was killed by the bushfire. Unlike most Eucalypts, *E. regnans* exhibits very weak regeneration, does not coppice freely and because of its thin bark is easily and usually killed by fire.

(3) It could be argued that the tall dead trees were not mountain ash but rather mountain grey gum killed by an extremely severe fire in that particular locality. However, there was an absence of the thick bark found on all mountain grey gum inspected throughout the entire burned area. Also, *E. goniocalyx* was present at the margins in the very narrow ecotone between *E. obliqua* and *E. regnans* where it could be expected to occur.

(4) In addition, on localized sites that were more exposed to wind and insolation than elsewhere within the mountain ash enclave and, where shallow krasnozems and podzols occurred, mountain grey gum was again present and vigorously regenerating. Thus, *E. goniocalyx* was present in all the local microhabitats where it normally occurs.

(5) Within the area of dead trunks occasional, isolated, fire-scorched but not killed *E. regnans* were present. Owing to some vagary of the fire-path or, perhaps due to localized less dense understorey scrub, radiant heat from the fire had caused leaf defoliation only. The characteristic slow very sparse regeneration of these isolated trees was unmistakable (Cochrane 1968b).

(6) The occurrence of *E. regnans* seedlings in some of the more open areas where sunlight was not shut off by dense undergrowth was one of the most conclusive arguments that this area of fire-killed trees was a former mountain ash community. Over much of the gentler slopes of the basin *E. regnans* seedlings, ranging in height from 1·3-3 m occurred at an average density of one per square metre three years after the fire. Seedlings were present but much less frequent on the steep slopes.

(7) Characteristic associated species of the Dandenong mountain ash communities such as *Olearia* spp., *Pomaderris, Pimelia, Pteridium,* and wire grass (*Tetrarrhena juncea*) were prominent among the regenerating understorey plants following the bushfire. Other species typically occurred with different *Eucalyptus* associations (Cochrane 1968b).

Furthermore, the pattern of plant species observed in this "enclave" was repeated immediately to the east where another similar but smaller, sheltered, south-facing area was present. In both these areas the distribution pattern of species was closely related to habitat conditions with *E. regnans* the most sensitive. Mountain ash distribution was influenced by a narrow set of environmental conditions. Wherever these appeared mountain ash vegetation was present. Beyond the basin on the north and west slopes *E. obliqua* and *E. radiata* replaced the mountain ash. Also, to the east beyond the protection of the western ridge *E. obliqua* replaced mountain ash on the spurs. In the lee of these spurs mountain ash reappeared.

TABLE 2

Frequency analysis of the direction of annual maximum wind gusts to 1962 at Melbourne. Directions not shown in the table each had zero annual maximum wind gusts.

Direction	N	NNW	NW	WNW	W	WSW	SW	SSE	NNE	E	SE
	11	4	6	3	2	3	4	1	1	0	0
			26			7			2		0

The reasons for this enclave of mountain ash forest on the major western exposed flank of the Dandenong Range resulted from its protection in the southern lee of Burkes Lookout and also from the long ridge to the west giving the basin an eastern lee situation. Spot anemometer recordings showed that wind velocities were only 1·8-3 m s on the southern slopes supporting the mountain ash enclave when they were 3-4·9 m s in the immediate lee of the main crest, in mountain grey gum and 20-22·4 m s on the exposed northern and western slopes clothed with messmate and narrow-leaf peppermint. Recordings over the period of field investigations showed that wind velocities in the basin were normally only 1/7-1/5 those on the northern and western slopes.

Strong winds (over 13·4 m s) are predominantly northerly. Expressed as a percentage of total winds above 13·4 m s 75-80 per cent are from the north or northwest, and 90 per cent are from northerly or westerly quarters. Whittingham (1964) showed that annual maximum wind gusts essentially conform to a similar pattern (Table 2). No mountain ash occurs on the exposed windward sites even where soil and moisture conditions are favourable for its establishment.

The sheltered basin also experiences much less insolation that the northern and western slopes (Figure 1) and a generally milder temperature (Table 1). Temperature range is approximately half that of the exposed northern and western faces only a few metres away (Table 1). Minimum values at all stations were generally within a few degrees of each other but maximum values were much greater at stations outside the basin than those within it.

The relief, configuration and the general lack of wind in the basin serve to trap and hold low clouds. Frequently cloud base was down to only 300 m elevation in the sheltered southern lee during the winter months when the western slopes were swept free of clouds to over 900 m elevation. During summer, morning mists and low cloud were frequently present in the sheltered basin when northern and western slopes were receiving large amounts of insolation. "Forest smoke" (Rossmann 1952) often clung about the tree canopy in the basin for about one hour after rain but was not widely observed elsewhere on the western flanks. Thus, apart from the enhanced effectiveness of total precipitation on the southern slopes due to less total insolation and less evaporation through lower temperatures, precipitation may also have been increased by up to one-fifth or more from interception and fog drip (Linke 1921; Grunow 1955; Nagel 1956). This creates favourable growth conditions for mountain ash communities.

Within the perimeter of the sheltered southern slope mountain ash

was found only where deep, friable, free-draining but moist krasnozem soils were present. It was replaced by mountain grey gum where soils became shallower or drier. Mountain grey gum also grew on steep rocky moist faces with skeletal soil. Messmate was present on the shallower and drier skeletal soils within the basin, especially on the steepest slopes. Thus, within the Dandenong Range, mountain ash occurs naturally only where a narrow set of environmental conditions are present. Because of its narrow ecological valence its distribution can be accurately defined from an analysis of the environment.

After investigations showed that the distribution of *E. regnans* was closely related to local environmental conditions, the small scale field investigations carried out in the Dandenong Range were tested on a much larger scale in the rugged Otway Ranges in southern Victoria.

Blue gum (*Eucalyptus globulus*), mannah gum (*E. viminalis*), messmate, mountain grey gum, and mountain ash form important distinct communities, each reflecting varying degrees of environmental control (Cochrane 1968a). Mountain ash occupied similar closely defined environmental parameters to those measured in the Dandenong Range. Detailed field investigations embracing a wide range of different site conditions showed a remarkably close relationship between species distribution, precipitation totals, the height of the cloud base and associated cloud drip, the prevalence of fog, the degree of exposure to wind and insolation, and soil conditions. *E. regnans* occurred where optimum climatic site conditions similar to those recorded in the Dandenong Range were present but it was absent in such localities if soil conditions were not favourable. Shallow soils, or overmoist, or very free-draining soils did not support *E. regnans*.

At elevations around 500 m and above, where rainfall was over 125 cm and cloud base frequently below 300 m mountain ash was found on all aspects if such locations were not very exposed to winds. In such areas shallow soils were less limiting as they usually remained moist. In areas exposed to strong hot or strong cold winds mountain ash was replaced by other species.

Ground control traverses in the Otway Ranges were located on vertical air photograph stereographic pairs to determine how accurately structure, texture, shade, patterns and other photographic properties could be analyzed for the wider mapping of sclerophyll forest communities. Measured field data showed that mountain ash vegetation in the Otway Ranges was closely related to environmental conditions. This information related to observed patterns on the vertical air photographs proved a reasonably successful method for mapping vegetation distributions over the difficult country of the Otway Ranges. *E. regnans* communities demonstrate Boyko's (1947) geoecological law of distribution that the micro-distribution of an ecotypic plant or of a plant community is a parallel function of its macro-distribution.

The specific topographical distribution (micro-distribution) of mountain ash in the sheltered area south of Burkes Lookout and its general geographical distribution in the Dandenong and Otway Ranges, and elsewhere in Victoria and Tasmania are all determined by the same ecological amplitudes. Thus, the distribution of naturally occurring mountain ash communities can be determined from an analysis of environmental characteristics, many of which can be readily interpreted from topographical maps and vertical air photographs.

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My full name and address is:

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I enclose the sum of $ in payment of the year's fee.

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Field Naturalists Club of Victoria

AN INVITATION TO PERSONS INTERESTED IN AUSTRALIAN FAUNA, FLORA AND COUNTRYSIDE

If you have not already an affiliation with the F.N.C.V., you may apply to the club either for membership or for regular subscription to the *Victorian Naturalist.*

These are some of the club's activities:

- General meetings each month, with informative, illustrated talks by prominent naturalists. These are held on the second Monday of each month, at the National Herbarium, South Yarra.
- Meetings of study groups comprising those with specialized interests such as geology, botany, microscopy, entomology, native fauna, etc.
- Organized excursions, led by nature experts, to places of interest, both near and far.
- The maintenance of a large lending-library of nature books and magazines.
- The publication monthly of the *Victorian Naturalist,* a well-illustrated nature magazine produced for the general reader as well as the expert. This is issued free to all members.

Membership is available to any person interested in nature; it is not necessary to have any specialized knowledge.

Membership Fees for the year 1969 are:

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Junior members (under 18 years of age)	$2.00

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If you are interested in either membership of the club or subscription to the *Victorian Naturalist,* please complete the appropriate parts of the form on the reverse side of this leaf and post it to:

Honorary Secretary, F.N.C.V.
National Herbarium
South Yarra,
Victoria 3141

(To be removed)

General Meeting—9 December, 1968

The Herbarium hall was full and the President Mr. E. R. Allan was in the chair.

The minutes of the previous meeting were taken as read on the motion of Mr. Woollard and Mr. Morrison.

The President presented a certificate of honorary membership of the F.N.C.V. to Miss Mary Bull, who has been a member for 40 years. In responding, Miss Bull expressed her pleasure in receiving the certificate. She said that although she hasn't been recently very active in the club, at the beginning, when she joined, she scarcely missed an excursion or a meeting. She has thoroughly enjoyed and appreciated all that she has received from the club. When she first came from England, she was expected to teach Botany, but despaired at having to take excursions as the native plants were unknown to her. She was recommended to go to the Botanic Gardens for assistance, and she saw Mr. St. John who advised her to join the F.N.C.V. and learn of the flora. He and Miss Janet Raff proposed her for membership and she went on the first excursion with Mr. Tadgell and enjoyed a wonderful and totally new experience, with billy tea at Hurstbridge. She often took her students over the same area, telling them what Mr. Tadgell had told her.

Four new members whose names appear in the December *Naturalist* were elected on the motion of Miss Allender and Mr. P. Curliss.

The Secretary said that he had received a letter from the 15th Brighton Scout Troop, asking for someone with knowledge of natural history to help them at their Camp at Gilwell Park on 29th December or 3rd January. Mr. Swaby and Miss M. Elder offered to help.

A letter from Wodonga was received asking for information on forming a Naturalist group.

The members were reminded that the Treasurer Mr. D. McInnes is ready to receive annual subscriptions due on January 1st, 1969.

The President read the report by Mr. McInnes on the Nature Show balance which showed a profit of $384. Of this $30 went to the Hawthorn Juniors and of the remainder one third was for the S.G.A.P. and two thirds for the F.N.C.V.

Miss Woollard has copies of "Insect Wonders of Australia" for 12c—the proceeds for the Junior Naturalist Club.

The President announced that nominations for the Council must be made next meeting, and that he would be away next year and would not be available for nomination.

The Subject for the evening was "Wild Flowers of the North" by Mr. Alan Morrison. He showed on the screen a map of the areas covered in the north of South Australia, in the Northern Territory, and the N.E. of Western Australia on more than one trip; which included the Everard Range, Ellery and Ormiston Gorge, and on another trip through Alice Springs, the Devil's Marbles, Tennant Creek, Mataranka, Katherine Gorge, Berry Springs, Darwin, Daly River Crossing, back to Katherine, Timber Creek, Kununurra, and the Ord River back through Timber Creek to Jasper Gorge and Victoria River Downs, and then back to Alice Springs.

Magnificent slides of the areas, and of the plants and animals seen were projected by Mr. Ian Morrison.

The emblem of South Australia—Sturt's desert pea (*Clianthus formosus*), plentiful this year, made a fine introduction.

The red weathered granite boulders of the Everard Range, the masses of pink everlastings (Schoenia), yellow everlastings, the large yellow guinea flowers of *Hibbertia glaberrima, Rulingia grandiflora* with pink flowers, the porcupine grass (Triodia) in full flower, and concealing its painful spiny leaves, a lovely pink spotted *Eremophila alternifolia,* white *Goodenia calcarata,* the brilliant red fleshy persistent sepals of *Eremophila calysina,* a creek bed with white barked Eucalypts harbouring parrots' nests all showed a grand array of beauty. A spotted gecko and the bower of a bower bird added life to this display.

The Corkwood tree—*Hakea lorea* with its spikes of cream flowers and rough corky bark contrasted with the tessellated bark of a bloodwood—*Eucalyptus terminalis.*

Of the twelve kinds of Hibiscus seen, *Hibiscus farragei* occurred in this locality. Striking patterns on the red earth were made by a white *Helipterum,* and the spreading ropy inflorescences of *Dysphania,* and big green pussytail heads of *Ptilotus macrocephalus.*

A picture of a red dusty bare track with dying mulga in a drought year was contrasted with a similar area this year after good rains showing the ground almost covered with flowers, (the geologists complaining that they could not see the

gibber). *Goodenia grandiflora* was well named. It is a 4 ft. high shrub.

At Daly River crossing a big salt water crocodile was seen but not photographed. The smaller fresh water protected crocodiles were seen at the Roper and Katherine and Ord rivers.

A disused copper mine was visited and a swamp with brolgas was viewed from this site.

A large pink hibiscus and a brilliant yellow one grew near the Daly.

Above Timber Creek store, native paintings were photographed showing horizontal figures.

Beyond this, Boab or bottle trees, some leafless, some leafy, were an outstanding feature—the large gourds and seeds being edible.

The Ord River with the brilliantly red hills at Kununurra were shown. Here two carnivorous plants were seen—*Drosera indica* having long narrow leaves with sensitive digestive hairs, and the pink-lilac flowered *Byblis*, having sticky but not sensitive hairs, as well as digestive glands on the stems and narrow leaves. The high cliffs of Jasper Gorge from which aborigines used to throw spears at the cattlemen overlook a chain of water holes. Two types of large cleverly constructed mason wasps' nests were noticed.

A small tree with spherical orange like fruits was *Strychnos lucida*. Birds eat the fruit and discard the poisonous seeds.

Acacias showed a great variety of forms from large very wide "leaves" to one with whorls of tiny "leaves" with thread-like points.

Amongst the great variety of beautiful hibiscus species *Hibiscus goldsworthyi* was remarkable with its yellow flower and densely hairy finely prickled leaves.

Pink *Calytrix microphylla* was a common shrub in many areas.

At Victoria Rivers Downs a warning was posted against a creeper with pods having bright red shiny seeds with black tips. This is *Abrus* containing abrin—the most potent poison known, which would cause death if the seeds were broken and eaten. The seeds were often used for beads. This plant was found on the trip.

The talk ended with a picture of the floral emblem of the Northern Territory—Sturt's desert rose—*Gossypium stuartianum*. The President thanked Mr. Morrison for his most interesting talk and the beautiful slides, and this was supported by enthusiastic applause from the large audience.

Mrs. G. Taylor announced a camping weekend on Dargo High Plains arranged by Miss Nancy Rossiter and Miss Jean Galbraith on Australia Day weekend. The road taken will be via Fernbank. Mrs. Taylor drew attention to articles on Nature Conservation in the Christian Science Monitor with 15 weekly episodes. Mr. Hanks said that he had arranged for twelve members to take part in the January Members' Night.

Nature Notes and Exhibits

Mr. Ken Strong asked for information on Moths collected at Balnarring—the male being small and grey and the female larger and steel blue. Mr. F. Morley showed mud nests of the fairy martin. These were given to him by the owner of the property at Deniliquin. These birds were not seen in the area before irrigation. Nests were built under a culvert in a water pipe with only 15 inches clearance—thousands of mud pellets made the 10 inch long nests. He said that Charles Barrett claimed that a group of birds combined to build a nest. If so who would be the rightful owner?

Mr. A. J. Swaby brought *Pratia pedunculata* (Trailing Pratia) which is usually prostrate, but this specimen was growing upright under a verandah by a wall facing north—presumably a reaction to the direction of light. He also showed *Pratia surrepens* (Alpine Pratia), *Mentha satureioides* (creeping mint), *Hydrocotyle geranifolia* (forest pennywort) and garden grown *Calothamnus quadrefidus* (WA), *Prostanthera lasianthos* (Christmas bush) and *Melaleuca pulchella*.

Mr. Ian Morrison brought a growing green flowered slender leek orchid—*Prasophyllum gracile* from Tonimbuki. This differs from *P. frenchii* in having a distinctly stalked ovary.

Mr. D. McInnes exhibited a marine spider like *Pycnogonida* showing a prominent proboscis on front, very little evidence of a body, 8 long legs with apparently branches of the intestine going down each leg.

He also showed a microscope tube from Russia, and appealed for any unused club microscopes that the owners would sell, as there is a demand for them.

F.N.C.V. DIARY OF COMING EVENTS
GENERAL MEETINGS

Monday, 13 January—Members' Night. Organized—Mr. E. Hanks.

1. Minutes, Reports, Amendments.
2. Correspondence.
3. Subject for the evening—"Members' Night".
4. New Members

   Due to there being no F.N.C.V. Council Meeting during December, applicants for membership during this month, will be listed in the February *Victorian Naturalist*.
5. General Business.
6. Nature Notes and Exhibits.

Monday, 10 February—"Echidnee". Dr. E. M. H. Ealey.

GROUP MEETINGS

8 p.m. at National Herbarium unless otherwise stated.

Wednesday, 15 January—Microscopical Group.

Friday, 31 January—Junior meeting at Hawthorn Town Hall at 8 p.m.

Monday, 3 February—Marine Biology and Entomology Group meeting in Mr. Strong's rooms in Parliament House at 8 p.m.

Wednesday, 5 February—Geology Group.

Thursday, 6 February—Mammal Survey Group.

Friday, 7 February—Junior meeting at Rechabite Hall, 251 High Street, Preston at 8 p.m.

Thursday, 13 February—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 18 January—Tooronga Falls. The coach leaves Batman Avenue at 9.30 a.m.; fare $2.00. Bring two meals.

The La Trobe Valley F.N.C. invite members to join them in a camp out at Dargo High Plains on 25 and 26 January, 1969. Transport is by private car, all necessities to be taken, and although there is a pleasant stream at Laubeys Plain where we shall camp, it would be wise to carry drinking water.

Some members will travel on Friday, 24 January. Take the road via Fernbank. Laubeys Plain is beyond Treasures Homestead as one travels from Gippsland. Treasures is the only house on the high plains and following the road past it the camp area will be near the stream, probably on the left.

29 August-21 September 1969—It is hoped to have an excursion to Western Australia at this time if sufficient members are interested. The party would leave by train Friday evening and arrive in Perth on Monday morning. A coach would be chartered and the party would travel to the Geraldton area for a few days, then south to Albany across to Busselton and back to Perth to catch the return train on Thursday arriving back in Melbourne on Sunday 21 September, 1969. Accommodation would be on a Dinner, bed and breakfast basis and members would be responsible for their own lunches. The cost would depend upon the number going but should not exceed $260.00 for train, coach and accommodation. As this trip will be dependent upon enough members wanting to go, those interested should notify the excursion secretary as soon as possible.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Geology: MR. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House. Melbourne 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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Front Cover:

This photograph by courtesy of A.N.A.R.E., and taken by John Béchervaise, is of Genntoo Penguins near Erratic Point, Heard Island. It accompanied an article in the *Vict. Nat.* Vol. 79, (8) p. 239.

Some West Australian Banksias

by L. Fell

Faced with the enormous richness of the West Australian flora it is rather hard to decide on which family to talk about; but in the south-west, banksias are visible to everyone and the identification key, by leaf shape, is easy to follow. There is the problem in that many of the best, flower late in spring or in summer. Coming west along Route 1 from Esperance, about a mile from the turn west, is a wide gravel scrape on the left; and here if you pull in, is *Banksia pulchella* about 3 feet in height, with yellow brushes, *not* pendant, and a small, nearly round cone. It is an attractive small shrub. A mile or two further on, in a patch of deep sand is the large bush, *B. speciosa*, with very long grey-green, deeply indented leaves. The brush is large, almost cone shaped, of pale yellow and silver-grey, with the flowers held outside the foliage. This is a spectacular tall bush, growing here *only* on deep sands. Anywhere along the uncleared roadsides one can find *B. repens* and *B. prostrata*, both prostrate forms. The Esperance variety of *B. repens* is almost mauve, as compared with that in the Stirlings, and the brush is longer. Between Esperance and Ravensthorpe, Bauri, (*Banksia nutans*) with its rabbit like cones held at the base of the stem and *B. sphaerocarpa*, with its close relation violacea (which has a small cylindrical wine coloured brush), can be found on sand plains by the roadsides. They grow to about 3 feet in height.

About nine miles east of Ravensthorpe, a gravel road turns left to Hopetoun. About one mile down this road is *B. lehmanniana*, growing as a dense attractive tall bush growing to about 4 feet 6 inches, with pale yellow brushes and big seed cones. Along this road also, can be seen the rare southern extension of the beautiful creeper *Marianthus pictus* and *Eucalyptus burdettiana* which is confined also to this area. At Jerramungup, still on the highway, turn left on Route 1 towards Albany. After about 30 miles, on the left, is a turn towards Bremer Bay, where if the Gnowangerup Shire has not totally destroyed the road verges, one can find *B. baxteri, B. dryandroides, B. coccinea, B. grandis,* and *B. quercifolia. B. baxteri* is a magnificent shrub of about 3 ft., with large golden flowers held well above the foliage. *B. grandis* and *B. dryandroides* are worth some discussion, being protean in their changes of ecology and form, and typifying the difficulties with some WA flora. *B. grandis* is found from Perth to near Esperance, within the 20″ isohyet. Growing in the Jarrah forest to nearly 50 feet as a tree, it can also be found along the limestone headlands of the south coast as a prostrate shrub; and yet again on sandplain near Bremer Bay as a small shrub 3 to 6 feet in height. On Cape D'Entrecasteaux, facing the westerly gales, it produces in November a magnificent dark green brush, from a base less than 3 feet high. At this stage the brush, which later changes to yellow, is a favourite food of the White-tailed Black Cockatoo. *B. dryandroides* (*Calyptorhynchus baudinii*) is less spectacular with a small yellowish brown brush, but very attractive foliage. Found in the Stirlings area, and eastward along the coast to the Gaird-

ner River, it ranges from over 3 feet high on sandplain to a prostrate shrub a few inches high on the ocean fringes; and a little more on the high peaks of the Stirlings. About 30 miles east of Albany, one passes the Many Peaks Range, towards which some side roads turn; and it is along these that *B. coccinea* grows as a small tree to about 35 feet. Strangely enough, these tall specimens seldom flower, and have no seed cones on them. There are a group of rather dullish semi-tree banksias in this area not discussed; but of course there are 30 varieties all told along this track. Nearer Albany are two more large attractive shrub banksias, *B. occidentalis* and *B. laevigata*, neither being plentiful. *B. occidentalis* is a delicate feathery shrub on sand, to about 20 feet, with a wine red brush, soon fading; whereas *B. laevigata* grows on the edge of swamps on the Gull Rock Rd. to a height of about 10 feet. Its brush is small, brown-violet in colour, and the leaves are stiff and prickly. Some of the coloured banksias have yellow forms as well, and these include *B. coccinea, B. occidentalis,* and *B. cayleyii.* Some interesting banksias grow on and around the Stirlings, 3 of which are endemic, and will be dealt with later.

* * * *

Darlimurla Area—A Botanical Survey

by Ellen Lyndon

This list of the ferns and flowering plants is by no means complete. I have not sufficient knowledge to attempt the grasses, rushes and sedges, for one thing, and I feel that there are people in the Club better fitted than I to deal with the orchids.

There are many gaps in the list where plants that should be in the area are missing, perhaps due to many years of clearing and firing. Early pictures of the area around Mirboo North and Darlimurla show the hills almost bare. The valleys of the watercourses are shallow so that the ferns were never protected by steep-sided gorges that a fire might jump. The filmy ferns are not there, and the Kangaroo Fern, so plentiful and lush in other parts of the Strzelecki where it sometimes clothes the introduced willows from top to bottom, is conspicuous by its absence.

The list is compiled from many excursions into the bush in perhaps a four-mile radius of the township, say from the Thorpdale road across to the Boolarra-Mirboo North road. It could no doubt be greatly increased by excursions in the spring when most of the plants are in flower. The Compositae, for instance, look very weak. There must be many more. I hope Club members will build up my contributions. Where families are listed, but no species given, I have added them because I feel sure the species will turn up if we can keep pace with the Forests Commission's clearing rate.

For one or two things I have gone outside the road boundaries mentioned above. *Drimys lanceolata* I know now from only sturdy specimens on the road to Boolarra about a mile or so outside Mirboo North. *Cryptostylis subulata*

in what is now cleared country south of the Thorpdale road behind Mirboo North. *Lycopodium deuterodensum* also south of this road in the vicinity of the Pumping Station. Others may know them in different places. I suggest that Mr. Graham Marshall be contacted as he has also done considerable searching in this country.

I have endeavoured to arrange this list in the same order as that given in Mr. Willis's *Handbook to Plants in Victoria,* where it applied; and for the rest the University of Melbourne *"Families and Genera of Victorian Plants"*; not forgetting, of course, Miss Galbraith's *"Wildflowers of Victoria"* at my elbow.

PTERIDOPHYTA:

OSMUNDACEAE
Todea barbara.

SCHIZAEACEAE

GLEICHENIACEAE
Gleichenia microphylla
Sticherus lobatus.
S. tener.

HYMENOPHYLLACEAE

CYATHEACEAE
Cyathea australis.

DICKSONIACEAE
Dicksonia antarctica

DENNSTAEDTIACEAE
Culcita dubia
Pteridium esculentum
Histiopteris incisa
Hypolepis punctata.

LINDSAYACEAE
Lindsaya linearis.

ADIANTACEAE
Adiantum aethiopicum
Pteris tremula
Pellaea falcata.

GRAMMITIDACEAE

POLYPODIACEAE
Microsorium diversifolium.

ASPLENIACEAE
Asplenium flabellifolium.

ATHYRIACEAE

ASPIDIACEAE
Rumohra adiantiformis
Polystichum proliferum.

BLECHNACEAE
Blechnum cartilagineum
B. nudum
B. procerum
B. minus.

LYCOPODIACEAE
Lycopodium deuterodensum.

PSILOPHYTACEAE

MONOCOTYLEDONEAE:

GRAMINEAE
Tetrarrhena juncea
Poa australis.

CYPERACEAE
Gahnia radula.

RESTIONACEAE
Restio tetraphyllus.

LILIACEAE
Xanthorrhoea
Lomandra filiformis
Thysanotus patersonii
Dianella tasmanica
D. revoluta
Stypandra glauca
Burchardia umbellata.

IRIDACEAE
Diplarrena moraea.

URTICACEAE
Australina muelleri
Urtica incisa
Parietaria debilis.

PROTEACEAE
Banksia spinulosa
Lomatia ilicifolia
L. fraseri
Hakea ulicina
H. sericea.

SANTALACEAE
Exocarpos cupressiformis.

LORANTHACEAE
Amyema pendula
Muellerina eucalyptoides.

CARYOPHYLLACEAE
Stellaria pungens
S. flaccida.

RANUNCULACEAE
Clematis aristata
Ranunculus lappaceus.
WINTERACEAE
Drimys lanceolata.
MONIMIACEAE
Hedycarya angustifolia.
LAURACEAE
Cassytha melantha.
CRUCIFERAE
DROSERACEAE
Drosera auriculata.
CRASSULACEAE
Crassula sp.
BAUERACEAE
Bauera rubioides.
PITTOSPORACEAE
Marianthus procumbens
Bursaria spinosa
Billardiera scandens
B. longiflora
ROSACEAE
Rubus parvifolius
Acaena anserinifolia.
MIMOSACEAE
Acacia stricta
A. dealbata
A. melanoxylon
A. verniciflua
A. myrtifolia
A. verticillata.
PAPILIONACEAE
Pultenaea stricta
P. scabra
P. juniperina
Dillwynnia sp.
Goodia lotifolia
Platylobium formosum
Indigofera australis
Daviesia latifolia
Hovea heterophylla
Glycine clandestina
Lotus sp.
GERANIACEAE
Geranium solanderi
Pelargonium australe.
OXALIDACEAE
Oxalis corniculata.
LINACEAE
Linum marginale.
RUTACEAE
Zieria smithii
Phebalium sp.
TREMANDRACEAE
Tetratheca ericifolia
POLYGALACEAE
Comesperma volubile.
EUPHORBIACEAE
Amperea xiphoclada.
STACKHOUSIACEAE
RHAMNACEAE
Pomaderris aspera
P. elachophylla.
DILLENACEAE
Hibbertia astrotricha.
HYPERICACEAE
Hypericum gramineum.
VIOLACEAE
Viola hederacea.
THYMELAEACEAE
Pimelea axiflora.
MYRTACEAE
Eucalyptus cypellocarpa
E. obliqua
E. baxteri
E. radiata
E. sieberiana
E. ovata
E. viminalis
Leptospermum juniperinum
L. ericoides
Melaleuca squarrosa
M. ericifolia.
ONAGRACEAE
Epilobium sp.
HALORAGIDACEAE
Haloragis tetragyna
H. micrantha.
ARALIACEAE
Teighemopanax sambucifolius.
UMBELLIFERAE
Hydrocotyle sp.
EPACRIDACEAE
Epacris impressa
Sprengelia incarnata.
MYRSINACEAE
Rapanea howittiana.

GENTIANACEAE
Centaurium pulchellum.
APOCYNACEAE
CONVULVULACEAE
Dichondra repens.
BORAGINACEAE
Myosotis sp.
Cynoglossom latifolium.
LABIATAE
Prunella vulgaris
Mentha sp.
Prostanthera lasianthos.
SOLANACEAE
Solanum nigrum (doubtfully native)
S. aviculare (or *lacinatum*?)
SCROPHULARIACEAE
Veronica calycina.
BIGNONIACEAE
Pandorea pandorana.
RUBIACEAE
Soprosma quadrifida
C. hirtella
Asperula sp.
CAPRIFOLIACEAE
Sambucus gaudichaudiana.
CAMPANULACEAE
Wahlenbergia sp.
GOODENIACEAE
Goodenia ovata
G. lanata.
STYLIDIACEAE
Stylidium graminifolium.
COMPOSITAE
Olearia lirata
O. argophylla
Senecio lautus
S. odoratus
Gnaphalium sp.
Cotula coronopifolia
C. australis
Bedfordia salicina
Helichrysum dendroideum = *bracteatum*
Cassinia aculeata
C. spectabilis
Helichrysum scorpioides.
ORCHIDACEAE
Cryptostylis subulata
Caladenia patersonii
Eriochilus cucullatus
Chiloglottis gunnii & *C. reflexa*
Pterostylis longifolia, nutans, alpina & *parviflora.*
[Either *Thelymitra grandiflora* or *media* made a great show along the roadsides near Darlimurla this past season.]
Dipodium punctatum.

WANTED

Susan Beattie, the Secretary of the Hawthorn Junior F.N.C. is anxious to obtain copies of *Wild Life,* edited by the late Crosbie Morrison.

The particular issues wanted are:

1940—August, September, October, November.
1941—February, May, August, November.
1942—July, August.
1943—April, August.
1949—September.

Any member who may be able to help can contact Susan at—
2 Clyde Street, Glen Iris 3146.

Phone 50 5263.

Corrections

In the report on the General Meeting for December 1968, given in *Vict. Nat.* for January **86**; p. 25, par. 3, "Miss Mary Bull" should read "Miss Mary Ball".

In the report on the General Meeting for September 1968, given in the *Vict. Nat.* for October **85**; p. 301, par. 5, the words "There are no members of the *Protea* family" should read "There are only two members of the *Protea* family".

The Genus Corybas in Victoria

by PETER UHLHERR

The genus *Corybas* Salisb. contains upward of 50 species. These are distributed widely from the Himalayan foothills east to the Philippines and south east through the Malay Archipelago, New Guinea, Australia and New Zealand. The genus also occurs in the Polynesian islands.

Holttum (7) lists 5 species for Malaysia. Rogers (8) states that the greatest development of *Corybas* appears to occur in New Guinea, where 19 species have been recorded. Australia has 9 species and New Zealand has 7 (6). Of the 7 New Zealand species 3 are related to Australian species and 4 to Malayan species. It seems unusual that none of the species occurring in Australia resemble the Malayan species. Hatch (6) concludes that the Australian forms probably became isolated very early in the development of the genus and so differentiated independently. The 9 Australian species are listed with authors and synonyms in Table 1. Their distribution by states and their flowering periods are given in Table 2.

Of the 9 Australian species, 5 occur in Victoria and none of these are endemic to that state. Willis (9) lists references to drawings and photographs of all Victorian species. However, since the publication of Willis' Handbook in 1962, a number of illustrations of *Corybas* have appeared. References to these more recent illustrations are listed in Table 3. This list is not necessarily exhaustive.

Despite the many new and excellent illustrations listed above, the author feels that identification of the species

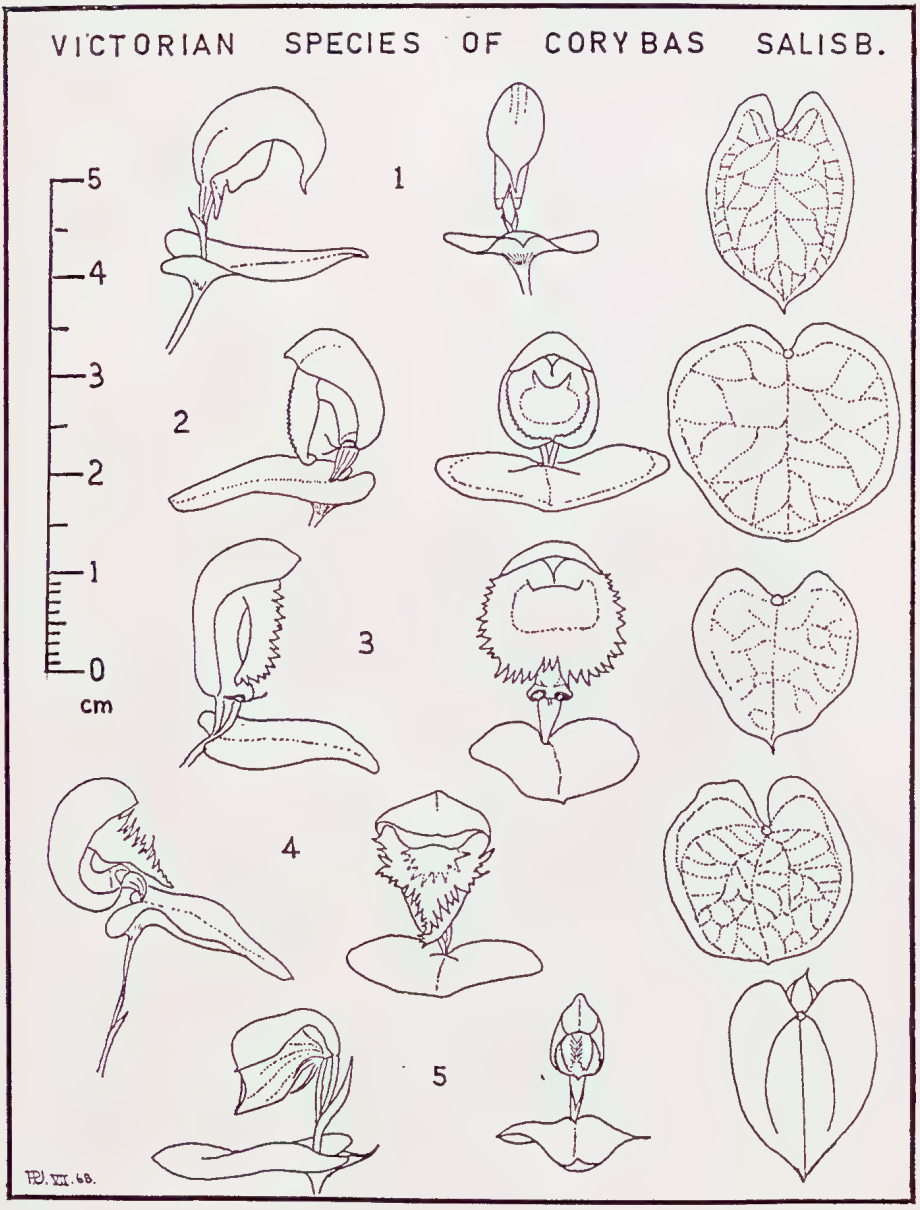
Table 1

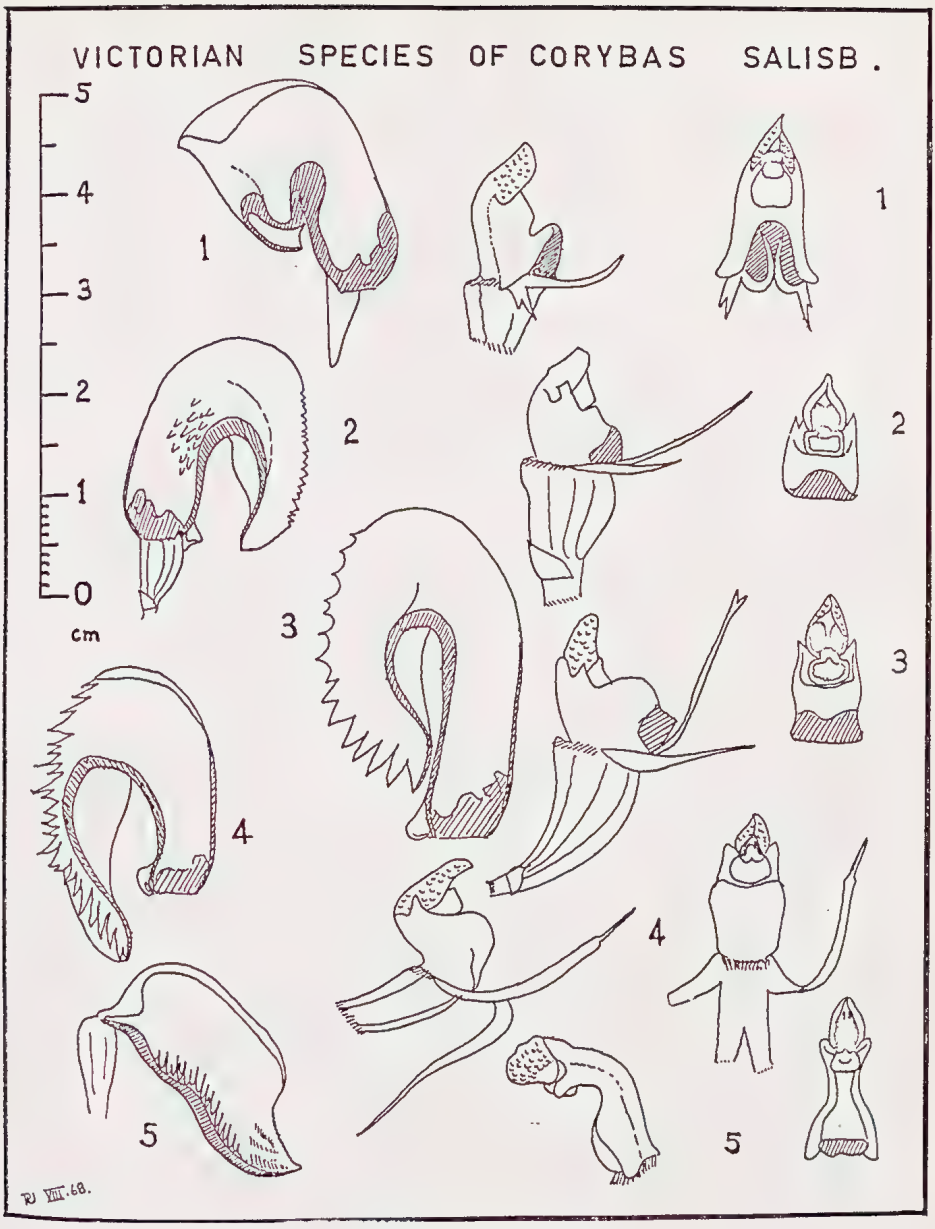
CORYBAS: List of species and synonyms

1. *Corybas abellianus*, A. W. Dockrill, Nth. Qld. Nat., **24** (112), 1 (1955).
2. *Corybas aconitiflorus*, Salisb., Parad. Lond., (1805), t83.
   Corysanthes bicalcarata, R. Br., Prodr. Flor. Nov. Holl., 328 (1810).
   Corysanthes cheesemannii, Hook. f. ex T. Kirk., Trans. N.Z. Inst., **3**, 180 (1871).
3. *Corybas diemenicus* (Lindl.) H. M. R. Rupp et W. H. Nicholls, Proc. Linn. Soc. N.S.W., **53**, 551 (1928).
   Corysanthes diemenica Lindl., Gen & Spec. Orchid. Plant., 393 (1840).
   Corysanthes fimbriata, R. Br. var. *diemenica* (Lindl.) Benth., Flor. Aust. **6**, 351 (1873).
4. *Corybas dilatatus*, (H. M. R. Rupp et W. H. Nicholls), H. M. R. Rupp, Proc. Linn. Soc. N.S.W., **53**, 551 (1928).
   Corysanthes dilatata, H. M. R. Rupp et W. H. Nicholls, Proc. Linn. Soc. N.S.W., **53**, 87 (1928).
5. *Corybas fimbriatus* (R. Br.) Reichenb. f., Beitr. syst. Pflk., 42 (1871).
   Corysanthes fimbriata R. Br., Prodr. Flor. Nov. Holl., 328 (1810).
6. *Corybas fordhamii* (H. M. R. Rupp) H. M. R. Rupp, *Vict. Nat.*, **59**, 61 (1942).
   Corysanthes fordhamii H. M. R. Rupp, *Vict. Nat.*, **58**, 83 (1941).
7. *Corybas pruinosus* (Cunn.) Reichenb. f., Beitr. syst. Pflk., 43 (1871).
   Corysanthes pruinosa Cunn., N.S.W. Mag., **1**, 41 (1833).
8. *Corybas undulatus* (Cunn.) H. M. R. Rupp et W. H. Nicholls, Proc. Linn. Soc. N.S.W. **53**, 551 (1928).
   Corysanthes undulata Cunn., N.S.W. Mag., **1**, 41 (1833).
9. *Corybas unguiculatus* (R. Br.) Reichenb. f., Beitr. syst. Pflk., 43 (1871).
   Corysanthes unguiculata R. Br., Prodr. Flor. Nov. Holl., 328 (1810).
   Corysanthes Matthewsii Cheesemn., Trans. N.Z. Inst., **31**, 351 (1899).
   Corybas Matthewsii (Cheesmn.) Schltr., Fedde. Repert, **19**, 23 (1923).

in Victoria would be greatly facilitated by comparative diagrams in a single figure. Such diagrams are given in *Figure 1* which shows a flower of each species from the side and from the front. The shape of the leaf is also shown. This information, although sufficient for identification, is supplemented by *Figure 2*, which shows the details of column structure and longitudinal sections of labella.

A longitudinal section appears to be tbe best way to draw the labellum shape since it is impossible to flatten the labellum without damage in all species of *Corybas*. The external floral characteristics which may be used to separate species are compared in *Table 4*.





Drawings by Author

← **Figure 1**

↑ **Figure 2**

Table 2

Distribution and Flowering Periods of Australian *Corybas*
(Roman numerals refer to months of the year)

Species	Qld (5)	NSW (4)	Vic (2)	Tas (3)	SA (8)	WA (1)	NZ (6)
C. abellianus	II-V	—	—	—	—	—	—
C. aconitiflorus	III-V	V-VII	VI-VIII	V-VII	—	—	V-VIII
C. diemenicus	—	VII-VIII	VI-VIII	VI-IX	VI-VIII	—	—
C. dilatatus	—	VI-VIII	VII-IX	VII-IX	VI-VII	VI-VIII	—
C. fimbriatus	IV-V	IV-VII	VI-VII	IV-VII	—	—	—
C. fordhamii	VII-VIII	VII-VIII	—	—	—	—	—
C. pruinosus	—	IV-VII	—	—	—	—	—
C. undulatus	V-VI	V-VI	—	—	—	—	—
C. unguiculatus	—	VI-VII	VII-VIII	VI-VIII	VII-VIII	X	VII-VIII

Table 3

Illustrations of Victorian *Corybas*
(In addition to those given by J. H. Willis (9))

C. aconitiflorus
Dockrill, A. W., Aust. Plants, **3** (26), 282 (1966).
Cady, L. I., Aust. Plants, **3** (26), 247 (1966).
Gray, C. E., Vict. Native Orch. (1966) tp 29.

C. diemenicus
Cady, L. I., Aust. Plants, **3** (26), 247 (1966).
Gray, C. E., Vict. Native Orch., (1966) tp 26 col.
———, Vict. Nat. **84** (10), tp 318 (1967).
Upton, W. T., The Orchadian, **1** (12), 157 (1965).
Goldsack, H., in Cotton B. C. South. Aust. Nat. Parks and Wildlife Reserves, (1964), p. 55.
Firth, M. J., Aust. Plants, **3** (26) tp 244 col. (1966).

C. dilatatus
Gray, C. E., Vict. Native Orch. (1966) tp 28.
Goldsack, H., in Cotton B. C. South. Aust. Nat. Parks and Wildlife Reserves, (1964), p. 55.
Cady, L. I., Aust. Plants, **3** (26), 247 (1966).
Palmer, P., Aust. Plants, **3** (26) (1966) t cover col.
Blackmore, J. A. P., The Orchadian, **2** (6), 77 (1967)

C. fimbriatus
Dockrill, A. W., Aust. Plants, **3** (26), 281 (1966).
Cady, L. I., Aust. Plants, **3** (26), 247 (1966).
Gray, C. E., Vict. Native Orch. (1966) tp 30 col.
Firth, M. J., Native Orch. Tas. (1965) tp 8.

C. unguiculatus
Upton, W. T., The Orchadian **1** (6), 67 (1964).
Gray, C. E., Vict. Native Orch. (1966), tp 27 col.
Firth, M. J., Native Orch. Tas. (1965) tp 8.

Table 4

Main Features for Identification

Species	Leaf	Flower habit	Labellum
Corybas aconitiflorus	Heart shaped; reticulate venation; purple underside	Stalked, carried quite high above the leaf; appears nodding.	Tubular, the opening concealed by the dorsal sepal; opening with sharply reflexed margins, minutely ciliate; tube prominently spurred.
Corybas diemenicus	Oval-lobed; reticulate veins; frosty-white underside; may be rather large (to 3·5 cm)	Sessile, very squat on the leaf.	Reflexed about the middle; posterior part tubular and equal in length to the anterior lamina; lamina margins denticulate, inturned for their whole length.
Corybas dilatatus	As for *C. diemenicus* but usually smaller (to 2 cm) and frequently mucronate.	Sessile, but carried erect above the leaf; very open appearance.	Very sharply reflexed about the middle; tubular part longer than the lamina; lamina with spreading, coarsely dentate margins.
Corybas fimbriatus	As for *C. diemenicus*	Sessile and squat on the leaf, often tilted backwards.	Reflexed about the middle; tubular part shorter than the lamina; lamina margins deeply fimbriate and inturned only near the tip of the lamina.
Corybas unguiculatus	Heart shaped; three nerved, prominent on underside; purple-grey below.	Stalked, carried quite high above the leaf; nodding appearance.	Labellum almost wholly tubular with a small opening which is not concealed by the dorsal sepal; the opening has extremely minutely denticulate margins; several rows of stick-like glands along the centre of the labellum, almost to its tip.

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2. Ewart, A. J. (1930)—Flora of Victoria. Victorian Government, Melbourne.
3. Firth, M. J. (1965)—Native Orchids of Tasmania. Devonport.
4. Gordon, E. G. (1965)—The Orchadian **2** (2): 25.
5. ————, (1967)—*ibid.* **2** (7): 98.
6. Hatch, E. D. (1947)—Trans. Roy. Soc. N.Z., **76** (4): 574.
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Notes on the Aborigines of the Donald District‡

by ALDO MASSOLA*

In April, 1843, a party consisting of three white men and two aborigines, left Hall's Station, west of Talbot, to explore the dry country to the north of the Pyrenees.

The two aborigines were to guide the white men to a large lake, which they said existed in that direction. The white men, J. B. Hall, E. McNeill and J. Darlot, were anxious to see this lake, for, if it did exist, they would "take up" the lands surrounding it.

The natives, however, had warned the white man that this lake was frequented by a monstrous "several miles long" snake, called Mindie, which was in the habit of devouring, with equal propensity, both "emus and blackfellows"; and the lubras of the tribe bewailed the party's departure with much lamentation and weeping, asserting that they would never return.

Nevertheless, the party did return, for after following the dry bed of the Avon River for one and a half days without finding any sign of water, or even moisture, and not believing that any existed further north, despite their two native guides' assurances, the party turned west, reached the Wimmera River, and made their way back home by ascending its course. Mindie thus remained in undisputed possession of the lake.

The belief in the existence of this monster was universal amongst the Victorian tribes. The Yarra River people described it as having a large head and two ears, with three fangs protruding from its tongue, and claimed that it hissed-out a white dust laden with all kinds of deadly diseases. It travelled with the speed of lightning, they said, by stretching itself over the tree-tops for a distance of between 20 and 30 miles. It was believed by them to have its lair on a mountain called *Bukker-panyool,* (the Middle-mountain, now Buckrabanyule) and to only drink from a creek called *Neel Kunnung* (Nasty or Poisoned Creek). The ground for a distance around the mountain was reputed to be so hard that no rain could penetrate it, and to be covered with small, hard, hail-like substance. This is probably a reference to the crystals of sulphate of lime found on the clay-pans in the Mallee, though not in the immediate vicinty of the mountain. The natives also claimed that the only trees growing thereabout were Mulin, this being probably the Yarra tribe's version of the Mallee, a tree which did not occur in their own country.

Though it would eat any man who ventured into its domain, Mindie only went forth hissing-out diseases when ordered to do so by Bunjil, the Great Man, or Creator, who sometimes thus employed him to punish wicked blackfellows. Mindie was also under orders to obey the members of a certain family, Munnie Brumbrum, who were the only humans who could live in that aweful country with impunity.

The Murray River tribes also dreaded Mindie, and attributed most diseases to the white powder which hissed out of its mouth. Whirlwinds, of which they had a superstitious dread, were

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‡ In preparing these notes, which formed part of a lecture delivered before the Donald History and Natural History Group on 6/9/68, I received much assistance from Ron P. Falla, of Litchfield, and I here wish to record my thanks to him.

believed by them to be caused by the movements of Mindie's tail.

Looking objectively at these beliefs, it seems clear that the aboriginal inhabitants of this region had invented Mindie in order to protect themselves from enemy raids, much in the same way as a being called Loan was said to protect the people living to the north of Wilson's Promontory.

Buckrabanyule (Bukker-panyool) is a three-peaked hill a little to the east of Charlton, which is on the Avoca River. The Avoca River is believed to have been the boundary between two tribes, the Jajawurong (to the east), and the Wotjobaluk (to the west). However, this tribal demarcation is only arbitrary, because it appears that the sub-roup who "owned" the mount formed part of a Wotjobaluk group. As far as can be ascertained this group's name was Jaara, and its territory included all the land (and water and game) encompassed within a rough line between Buckrabanyule, Emu, Stuart Mill, Marnoo, Birchip, Wycheproof, and back to Buckrabanyule. This was, in fact, the territory over which Mindie roamed. The family, or sub-group to whom Buckrabanyule was allotted, was probably called Panyool-boluk, the Hill-people; and Munnie Brumbrum was probably only the local name for two mythical heroes, generally known to the N.W. Tribes as Bram-Bram-Bult, the Two Bram-bram. These two heroes* eventually became the two stars known as The Pointers, but while on earth, they performed all kinds of mighty deeds.

There is no doubt that the whole of this territory, despite Mindie, and dry as it is at times, did support a fairly large aboriginal population. This is indicated by the many occupational traces left behind by them, in the guise of canoe and shield trees, rock water-holes, oven mounds, and camp sites, as well as the innumerable stone implements either held by local collectors or still awaiting to be picked up. Close to the foot of Buckrabanyule, on Mr. Jack Mitchell's property, there is a beautiful specimen of a tree from which timber for a shield has been removed. In the near vicinity there are several oven mounds, marking native cooking places, which means that water was not far distant, although none is visible now, due, probably, to the clearing and tilling of the land, which often results in the destruction of native springs or soaks. Even the spring of mineralized, and therefore nasty-tasting water on the south-east flank of the hill only occasionally runs. Incidentally, this spring must have, in aboriginal days, given forth a lot of water, since it formed a well-defined bed down the side of

Shield Tree near Buckrabanyule. *photo*: Author.

* See my book, *Bunjil's Cave*, for the adventures of these two brothers.

the hill. It must have been Neelkunnung, the nasty, or poisoned creek from which Mindie drank.

One of the main camps of the Jaare is on a low rise about three miles west of Charlton, a little to the north of the present highway to Donald. On the eastern flank of this rise there are numerous outcrops of granite, one of which contains a beautiful example of those rockwells, excavated by nature and helped by the aborigines, which were so precious to them at the time of the year when ordinary waterholes had dried up.

The native name of this rockhole is *"Youanduk"*, meaning a-basin-in-a-rock, from *youan*, or *yowang*, "hill", and therefore "rock", and *duk*, "frogs", this word having associations implying water and rain.†

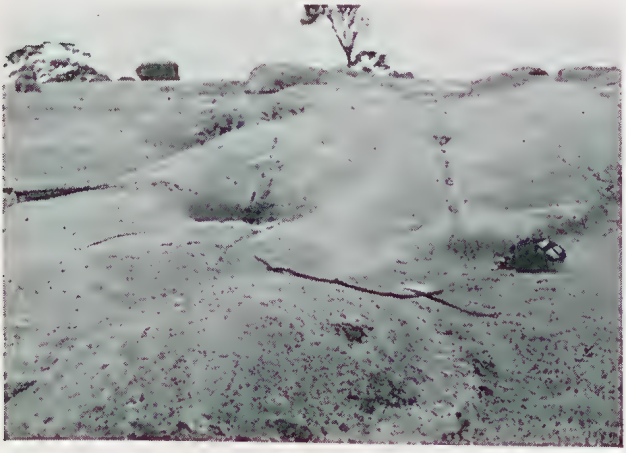
Below the granite boulders there is a sandy stretch, many hundreds of yards in extent; and there is the evidence to prove that the place was a camping site. Thousands of stone fragments, chips, flakes and cores, are strewn everywhere, and amongst them there are still many implements, chiefly the pigmy kind called by ethnologists microliths. The larger, and more obvious stone tools, the axes, grinders and hammers have, however, long since been collected by local farmers and other interested persons.

In looking at the great extent of this campsite, it becomes obvious that the water from the rock hole would have been insufficient to quench the thirst of all. But there are a number of small depressions in and around this campsite; and these no doubt mark the site of former soaks, from which additional water could be obtained.

This camp was ideally situated on the native track which ran from the numerous campsites along the Avoca River to the site of the great tribal gatherings at Lake Buloke. The first day's trek west from Youanduk would have been about five miles to Lake Wooronook, where there are some ovens and now ploughed-out campsite. The next stop was at Mount Jeffcott, a distance of about five miles, where the are more ovens. The Mount served as a direction finder. The next stretch was of eight miles to the very large campsite on the sand dunes on the south-east corner of the old bed of Lake Buloke. The Borung Highway bisects this camp, and it is interesting to see that this modern highway roughly follows the old native path.

The Lake Buloke camp was probably known to the aborigines as *Banyenong* (from which both Banye-

† See my book, *Aboriginal Place Names.*



Youanduk Rock Hole, 3 miles west of Charlton. (Note scale compared with camera bag.)

photo: Author.

nong and Banyena take their names). It comes from *Banye,* "a burning", but only applicable to roots and stumps, and *Nong,* which denotes the past. This strange name referred to a legend (for details of which see *Bunjil's Cave*) which has it that the lake's depression was caused by the burning out of the roots of a giant pine tree. This depression later filled with water, and thus became Buloke. The Lake, a name also suggestive of the cry of the bullfrog, which inhabits the shallows.

During the wet period of about 5,000 years ago, if not later, the lake was much greater in extent, as witnessed by the continuous line of sand dunes, and old shore, stretching from just north of Donald almost to Corack, and from Banyenong in the east, almost to Massey in the west. There are great concentrations of oven mounds, or native cooking ovens, both in the south of this former bed, and on its northern periphery, at what are now Box Swamp and Mini Swamp. The ovens around this former lake-bed and along the Richardson River have been carefully mapped by Barry Golding, of Donald, to whom I wish to record my indebtedness. He must have spent weeks on this research, the results of which he so freely placed at my disposal.

The campsites, or "blows", upon which stone implements can be collected are generally found far removed from the oven mounds. Just why this should be is one of the unsolved mysteries of the pre-history of Victoria. In a former paper (*Vict. Nat.* **83** (6), June 1966) I have discussed these mounds as they occur in this State, and all I need state now is that the local evidence around Lake Buloke suggests that the oven mounds antedate the campsites. The oven mounds are on the old shore of the lake; often in places which are now dry. The campsites are either close to present semi-permanent water, such as at York Plains, Lake Cope Cope, Lake Murrumbeet and Lake Wooroonook; or else they are close to surface water or soaks, such as at Banyenong, at the little blow south of it on the sand dunes above Dunstan's Lake, at Creswick's Well, at Youanduk, and on the Brothers Barrance property near Donald.

What do we know of the people who lived at these camps and hunted upon these plains? A few short lists of words, one or two legends, and some place-names. Our lack of know-

Youanduk campsite. (Rockhole on rise in left of photograph.)

photo: Author.

ledge is aptly summarized in *Past and Present,* a booklet published by the Donald Times in 1926, in which it is stated that:

"At one time tribes of 'blacks' lived around the River Richardson . . . the natives caused but little trouble to the white man. Their bellicose steam they 'let off' on one another, and the tribal fights were interesting rather than fear-inspiring. Gradually the 'blacks' moved away or died and left the country to the invading whites".

However, we do know that before they "moved away or died", a number of aborigines were employed by the squatters, first in stripping bark from trees for hut-roofs, and later as shepherds and stockmen. This fact is stated in several of the early records, including the very interesting diary kept by Thomas Guthrie the First, and now in the possession of his grandson, Mr. Oliver Guthrie, of Rich-Avon, who kindly drove me to several of these early "scarred trees", as well as to numerous oven mounds and to at least one "canoe tree", still extant on his ancestral Guthrie Estate, and all of which he has gone to great pains to preserve.

Some of the aborigines who later became stockmen now repose in the little "aboriginal stockmen cemetery", unfenced and only marked by an upright cement post, in one of Mr. Alec Russell's paddocks, quite close to Donald. Although little known, even to the local people, this cemetery should rank high amongst the few aboriginal antiquities left in this part of the State.

The first white men to settle in the district are believed to have been the Creswick brothers. They arrived in February, 1844, and built their hut on the western side of the River Avon, where Gray's Bridge now is, a picturesque locality known to the aborigines as *Koruckubeal,* "Where-the-red-gum-flowered". In 1846 (or 1847) the brothers having married, the run was divided into two, one brother, John, erecting his homestead close to a small reed-covered swamp, simply known to the natives as *Murt,* "waterhole", which they knew never ran dry. In 1866 a bore was sunk to a depth of 54 feet on this waterhole, and although now disused, its site is marked by an engraved cement post, the inscription on which states that the bore did good service during the droughts of 1881, 1902, 1915-16, when it held the only available water for miles around.

The other brother, Charles, built his home on a sand ridge close to the eastern bank of the river, in which, at this point, there was a deep waterhole. This was the York Plains homestead, and the sand ridge it was built upon was the Koruckubeal native camp. The homestead has long since crumbled, but stone implements left behind by the aborigines can still be found there.

Then in October, 1844, the brothers James and John Donald and Robert Macredie, guided by natives, reached Lake Buloke, thus at last discovering the "large lake". Mindie, the monster snake, had apparently discreetly retired, because it was not seen. Soon, claims were staked, and the entire land surrounding the lake was occupied by squatters.

The "king" of the local aborigines appears to have been individual who became known as Johnny. Both he and his principal lubra, Mary, were presented with "King plates" by William, the youngest of the Donalds, who had in the meantime joined his brothers at the lake. No doubt King Johnny presided over what is believed to have been the last gathering of the local tribes, which took place at Thos. Scott's Rich-Avon West Station in 1866. The meeting lasted a week, and about 200 tribesmen from the Avoca, Richardson and Wimmera Rivers, are

said to have been present. King Johnny died on 29th January, 1883, and was buried in the Donald cemetery.

The next in line of Royal Succession was Johnny's nephew, who was known as Big Bob, or Murdering Bob, or Morton Plains Bobby. King Robert of Morton Plains died at the Ebenezer Mission Station, north of Dimboola. on 10th April, 1896, aged about 70. He was buried in the Station's cemetery. The next King was Anthony Anderson, "King of Birchip, Morton Plains, Donald and Surrounding Country". He died at, and was buried at, the Coranderrk Aboriginal Station, near Healesville, on 14th March, 1914, believed to have been about 74 years of age. The last of the Jaara was Robert Kinnear of Charlton, who won the Stawell Gift in 1883. He died at Antwerp, on the Wimmera River, when aged about 80 on 6th January, 1935.

While most aborigines of Victoria appear to have been sport-minded, as witnessed by the honours gathered by the many native football and cricket teams, the Jaara seem to have exceeded them all at footrunning and horsemanship. As well as Robert Kinnear there was Black Mattie Hines, who combined footrunning and horse riding, and who won some important flat races and steeplechases. Jacky-Jacky, another local aboriginal, won a horse riding event, Tilting the Ring, and the 300 yards foot race at the Donald Sports on 4th Janaury, 1868. Black Robert Macredie (named after Robert Macredie, the pioneer) was a very fast runner, said to be able to do the 100 yards in under 10 seconds; he won the 200 yards at the Donald Sports in 2nd January, 1869. He was also a splendid horseman. On 10th April, 1878, at the Warracknabeal Sports, the aborigines were reported "to be holding their own" at several events.

After this time, however, they became fewer and fewer, and gravitated towards the Aboriginal and Mission Stations, where their tribal identities were lost, and where their half-caste descendants became absorbed into "The Aborigines of Victoria".

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A Mammal Survey of Stockman's Reward*

by R. Fryer† and I. Temby†

Introduction

Stockman's Reward is a flood plain formed at the junction of Arnold's Creek and The Big River about 23 miles north-east of Marysville on the Big River road. A swampy valley has evolved about 1,800 feet above sea level and the hillsides rise suddenly and steeply from the edge of the valley (See Figure 1). Approximately eight hundred acres were surveyed and a comparison made between the animals found on the four hundred and fifty acres of flat valley and those found on the three hundred and fifty acres of dry hillside. Three field trips, one in May 1967, one in May 1968 and one in June 1968, were conducted in the area. Rain fell frequently but the weather, on the whole, was fair. Snow fell in the higher districts and the overnight temperatures ranged from 30°F to 38°F. Of the fifteen days spent on this survey, there were eleven nights of detailed spotlighting, eight days of trapping and one day of collecting and identifying plant specimens.

Considerable land use has occurred in the area and Stockman's Reward has a long history. The name came from a stockman who apparently found his "reward" there in the form of gold. A large amount of mining has taken place there, evident by the cleared area in front of the hut and the many disused mine shafts scattered about the valley. Many trees have been removed for timber but the actual survey area has not been subject to timber cutting for many years.

Grazing occurs intermittently whenever the snow is too deep for the farms in the Matlock area, but the area is otherwise visited only occasionally. The native mammals are therefore largely free from interference by man.

Topography and Flora

The flood plain area has a layer of rich soil up to two feet thick over deep alluvial gravels. This soil, which in places was always swampy, supported a wet sclerophyll-type vegetation. There was a thick ground cover of Tussock Grass (*Poa caespitosa*) in the cleared area around the hut, replaced in other areas by a Sedge (*Carex* species) and Long Mat Rush (*Lomandra longifolia*). The introduced Blackberry (*Rubus fruticosus* group) and the Molucca Bramble (*Rubus moluccanos*) were found in isolated localities throughout the area.

Four species of fern existed on the flood plain. Mother Shield Fern (*Polystichum proliferum*) and Fishbone Water Fern (*Blechnum nudum*) being very abundant wherever they were found, while the Rough Tree Fern (*Cyathea australis*) occurred only in limited numbers. Austral Bracken (*Pteridium esculentum*) was common throughout the flood plains.

Blackwood (*Acacia melanoxylon*) was very plentiful beside the creek where it grew to a height of fifty feet. It also occurred in pure stands of up to a hundred trees. Lightwood (*Acacia implexa*), though much less abundant than the former, was also widespread. Silver wattle (*Acacia*

* This report was originally submitted as a project to the Science Talent Search 1968.

† Mammal Survey Group, F.N.C.V., C/-Secretary, 40 Howard Street, Reservoir 3073.

dealbata) was scattered throughout the flood plain. Very many of the Silver Wattles found were dead, probably because of an infestation of borers, as flight holes attributable to these insects were seen in the trunks. Prickly Teatree (*Leptospermum juniperinum*) grew immediately beside the creek.

The Eucalypts were the most noticeable components of the habitat. Six species were found on the flood plains. Candlebark (*Eucalyptus rubida*), Swamp Gum (*E. ovata*), Manna Gum (*E. viminalis*), Narrow-leafed Peppermint (*E. radiata*), River Red Gum (*E. camaldulensis*), and Red Box (*E. polyanthemus*).

The hillsides are generally of grades of about one in five and the shallow topsoil is a reddish coloured clay, with battered sandstones protruding in several places. There was very little ground cover. Vegetation here consisted of the Hook Sallow Wattle (*Acacia mucronata* var. *dissitiflora*) which was very prolific on the drier slopes, Elderberry Panax (*Tieghemopanax sambucifolius*) occurred in conjunction with the Hook Sallow Wattle. Forest Wire-grass (*Tetrarrhena juncea*) entangled all the other hill vegetation. Silver Wattle also occurred extensively on the slopes in considerable numbers. Long Mat-rush (*Lomandra longifolia*) was dominant in the damp gullies intersecting the slopes.

Three eucalypts occurred on the hillsides. The commonest on the drier slopes was the Narrow-leafed Peppermint. Red Box (*E. polyanthemos*) was found scattered through the stands of Peppermint. Manna Gum, where found in hillside situations, usually had a very thick butt, twisted and gnarled, quite different from the Manna Gums of the flats, which were tall, straight trees up to a height of about one hundred and fifty feet.

Methods used in Surveying

Because of the diversity of mammals found in the area it was necessary to employ several overlapping methods of surveying. The most productive means was spotlighting at night. Most native mammals are nocturnal and spotlighting provided the best opportunities of observing the slower moving species. Spotlighting was generally begun each night at twilight and the two "Big Jim" spotlights were used.

Most spotlight observations were of possums, and two species were found very easily by their eye reflections. These were the Greater Glider and the Ringtail Possum, whose eyes appear white and red respectively in the light from spotlight beams. It was necessary to listen for the other possums, especially the Bobuck and the Yellow-bellied Glider, which are easily identified by their calls. More difficulty was experienced in finding other species—Sugar Glider and Feathertail Glider—because both of these are so small that considerable patience and intense listening were necessary to locate them.

Ground mammals are difficult to observe by spotlight and twelve cage-traps were used to collect them. The wire-mesh traps were 14″ x 8″ x 7″ in size and were baited with a mixture of peanut butter, oatmeal and honey. All animals caught were unharmed and were released in the area of capture, except for an Allied Rat and a Brown Phascogale which were lodged with the Department of Fisheries and Wildlife. The traps were set each afternoon wherever there was evidence of ground mammal activity and each morning the traps were collected and the catches recorded and released. Each night a different area was trapped and care was taken not to disturb traps during the night. The easiest places to trap were along creek

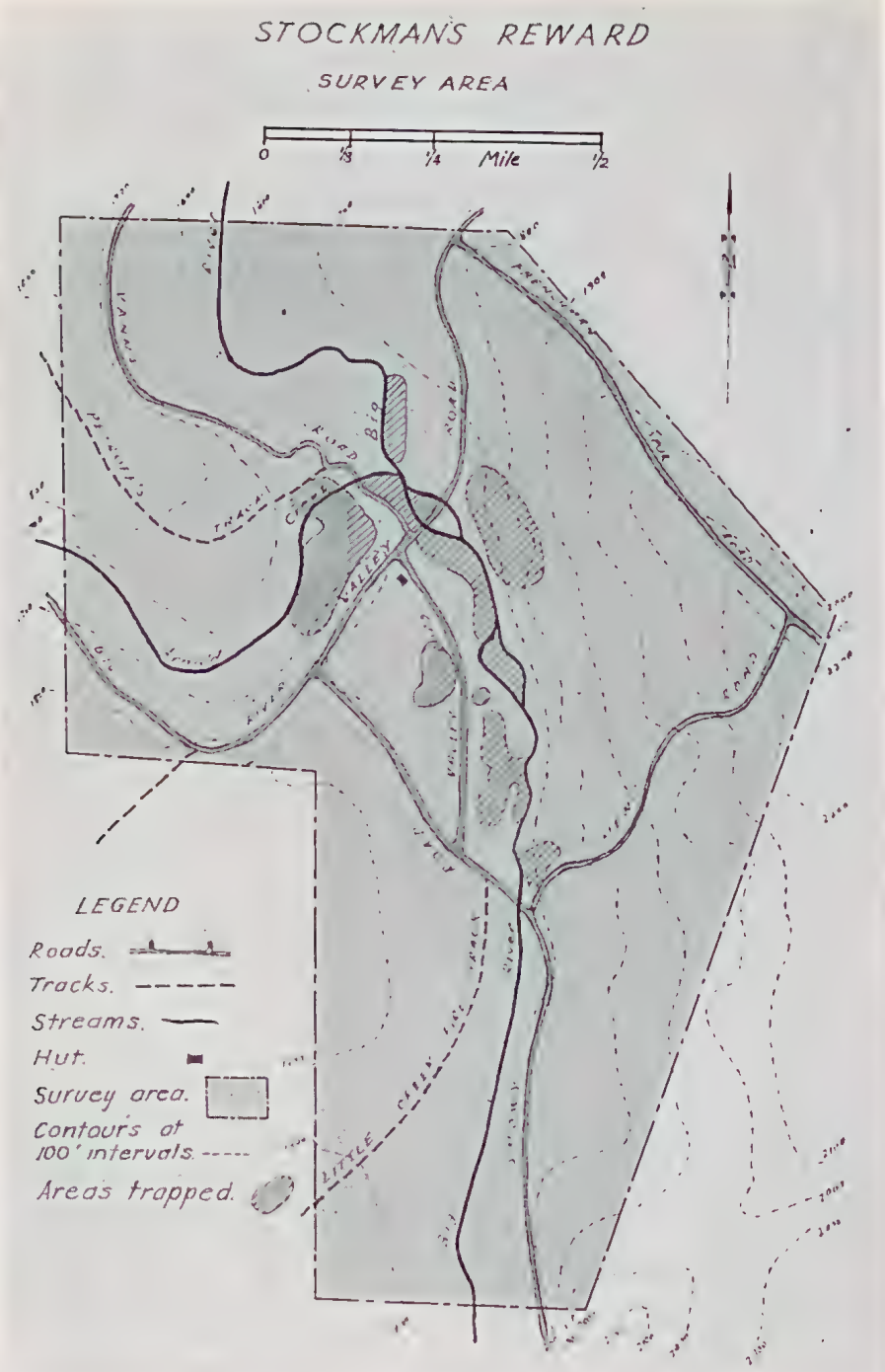
STOCKMANS REWARD
SURVEY AREA
0
1/8
1/4
Mile
1/2
LEGEND
Roads.
Tracks.
Streams.
Hut.
Survey area.
Contours at 100' intervals.
Areas trapped.

Figure 1

banks where there was an abundance of runways and burrows, but elsewhere it was necessary to search on hands and knees for good trap sites.

Walks during the day provided valuable indications of the mammals in the area. Wallabies were sighted only during the day and two Wombat skulls and a Brown Phascogale skeleton were found during day trips. Tracks and faeces of dogs were seen often and fox faeces and a large patch of red fur from a fox were found. Powerful Owls were present in the area and their disgorged pellets of undigested fur and bones were examined whenever they were found.

Results

The results of the survey are given in Table I. The most numerous mammal in the valley was the Greater Glider. These showed a preference for the young gums, even though they are noted Peppermint eaters. Consequently only six of the thirty-seven sightings were on the hills. Several were seen gliding at Stockman's Reward, often between trees about ninety yards apart.

One Yellow-bellied Glider was heard calling on several occasions and was seen once when it glided from a Swamp Gum for about ninety-yards to a Manna Gum, in the centre of the

TABLE I

Survey Results

(a) *Sightings*

Common Name	Proper Name	Number recorded	
		1967	1968
Greater Glider	*Schoinobates volans*	27	10
Yellow-bellied Glider	*Petaurus australis*	1	0
Sugar Glider	*Petaurus breviceps*	2	1
Feathertail Glider	*Acrobates pygmaeus*	3	1
Bobuck	*Trichosurus caninus*	3	5
Ringtail Possum	*Pseudocheirus peregrinus*	4	12
Platypus	*Ornithorhynchus anatinus*	1	0
Eastern Water Rat	*Hydromys chrysogaster*	0	1
Brown Phascogale	*Antechinus stuartii*	0	11
Allied Rat	*Rattus fuscipes assimilis*	0	20
Black Wallaby	*Wallabia bicolor*	0	5
Bats	Two unidentified species	—	—

(b) *Other evidence*

Common Name	Proper Name	Form of Evidence
Wombat	*Vombatus hirsutus*	Skulls (2), burrows, faeces, tracks
Brown Phascogale	*Antechinus stuartii*	One skeleton (1967)
Rabbit*	*Oryctolagus cuniculus*	Faeces, burrows, skeletal remains
Fox*	*Vulpes vulpes*	Faeces, tracks, fur, smelled several times
Dog*	*Canis familiaris*	Tracks, faeces, heard howling

* Introduced species

flood plain. As these animals are generally uncommon and are semi-nomadic, it seems probable that the area was visited by them regularly.

Because of the difficulty of spotlighting smaller animals only three Sugar Gliders were observed. These were seen beside the Big River Valley Road and at Arnold's Creek, within about three hundred yards of each other. Similarly, three Feather-tail Gliders were seen during the 1967 trip, all in the one tree in the middle of the valley and one was seen in 1968 on the hill beside The Big River Valley Road in a Peppermint tree.

The Bobucks present in the survey area were all silver-grey in colour (the "Mountain Blue" of the locals), and the Ringtail Possums were a beautiful rufous colour on the sides and forelimbs, and had fluffy white ear tufts.

Eight Bobucks were seen altogether, and of these, only two were seen in the hills. Sixteen Ringtail Possums were seen and were fairly evenly spread between valleys and hills.

The Water Rat and Platypus are both shy animals and are a rare find at any time. The Platypus was seen in The Big River near the junction of Snowy Road and New Road in 1967 and the Water Rat was found walking up The Big River Valley Road in broad daylight.

Noises attributable to macropods were heard during the 1967 trip, but none was seen until 1968. Five Black Wallabies were observed during the day on hills near Frenchman's Spur and Little Creek fire trail.

The ground animals, Allied Rats and Brown Phascogales could only be observed by trapping. Although thirty-five of the total of ninety-one trap-nights were on the hills, no animals at all were collected there. The rest of the time traps were set in the valley and thirty-one animals—twenty Allied Rats and eleven Brown Phascogales—were collected. All these were caught where there was thick ground cover of Blackberry, Tussock Grass or Long Matt Rush, or beside holes in creek banks. Traps set beside burrows always caught animals, even a small wren was trapped.

Many bats were seen hawking for insects on the warm nights, but the species could not be identified. Shot guns or mist nets are essential items for the collection of bats and as these were not available no bats were collected.

Dogs were common in the area, as many tracks and faeces were found. A lot of deer hunting occurs near the area and hounds are lost, turn wild and form packs. One of these packs was heard howling like dingoes near the top of Petroff's Track.

Conclusions

The differences in the numbers of individuals recorded in 1967 and 1968 are, in general, not significant. However, the difference in the number of Greater Gliders seen on each trip was probably significant. Even this habitually wet area dried out excessively during the drought and many of the eucalypts on the hills died. In the valleys undergrowth was killed and the young gums, the main supply of food for the Greater Gliders, dried out considerably. As the Greater Glider population in 1967 was quite concentrated, some had to leave to find new areas of food trees and this could explain the fewer sightings of Greater Glider in 1968. Ringtail Possums probably have a less specific diet than the Greater Glider, their food trees being more abundant and less affected by the drought. Thus, as more Greater Gliders moved out, more Ringtail Possums were observed.

The hills were affected much more than the valleys by the drought and

this could explain why few animals were recorded there. On the hills there was much less ground cover and probably less food, consequently no rats or phascogales were trapped there. There were however, more occupied Wombat burrows in the hills than in the valley.

It is a common habit for Black Wallabies to frequent gullies in hot weather, but in cold weather they generally move to the higher ridges and they were only seen on hills in the survey area.

Acknowledgments

The authors express their thanks to the following persons who helped throughout this investigation; Messrs. A. L. Temby, A. R. Jackson, P. Jackson, C. N. Fryer, P. Martin, J. Cummins, and D. Nance. Miss H. J. Aston and Mr. R. V. Smith of the National Herbarium helped with plant identification. The Mammal Survey Group, F.N.C.V., provided equipment and the Fisheries and Wildlife Department provided permits to handle protected species. Dr. J. W. F. Hampton and Mr. J. H. Seebeck read the manuscript.

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Summary

Twelve native and three introduced species of wild mammals were found to occur at Stockman's Reward. The individual count was one hundred and ten individuals. In addition, two species of bats were seen but were not identified.

Book Reviews

Australian Sea Shells

By John Child

(Published by Cheshire-Lansdowne in the Periwinkle series)
Lightweight cardboard cover, approx. 5" x 7¼". 80 pages and 16 pages of colour plates, with 20 half-tone plates and more than 100 in-text line drawings. Price $1.25.

This is an enlarged and re-set 4th edition of a book originally published in 1959. After an introductory chapter explaining the classification of molluscs, their importance to man, notes on their distribution and ecology and an explanation of some of the scientific names, the remaining five chapters are devoted to the main groups of sea shells. In all 108 species are described, figured as line drawings and an idea given of their habitats and distribution in Australia. These latter features are perhaps the most useful parts of the book.

However, much more care should have gone into the preparation of this book as it contains a number of errors, some quite serious. For instance, there is one entire colour page of six plates, which have been printed in reverse so that all the shells appear sinistral; a number of the colour illustrations have the wrong captions, and in the text, the arrangement is such that *Gena impertusa* appears to be included in the Haliotidae instead of the Trochidae. The colour plates are poor, both in the choice of specimens, many of which are plainly beach-worn, and in the

colour reproduction which, in some cases, makes the species almost unrecognizable. The choice of species, too, is hard to follow, as many quite rare molluscs are dealt with quite fully while some very common species are omitted. Regrettably, therefore, it must be concluded that this book does not fulfil its intended role and cannot be recommended.

BRIAN J. SMITH,

Curator of Invertebrates,
National Museum of Victoria.

Australian Seashore Life

By JOHN CHILD

(Published by Cheshire-Lansdowne in the Periwinkle series)

Lightweight cardboard cover, approx. 5" x 7¼". 87 pages and 16 pages of colour plates, with 35 half-tone plates and many in-text line drawings. Price $1.25.

The stated intention of this book is to give the person with no previous knowledge an insight into the different groups of animals he is likely to come across on the seashore and a little information about how they live, with the emphasis being placed deliberately on the less well-known groups. It commences with a general introductory chapter on life in the sea, dealing briefly with such topics as tides, zonation, food and feeding habits, and a few words on scientific classification. This is followed by 12 chapters dealing in turn with the main group of plants and animals commonly found living between the tides. These give an account, in a general way, of the major characteristics of the group and attempts to answer in a simple way some of the queries people have when meeting a strange animal for the first time; such as, how does it feed and what does it eat; how does it breed and what do particular structures do. It does not, however (nor for its size is it reasonable to expect that it should), supply descriptions of particular species, although in some cases specific examples are used. It must therefore be looked on as a very elementary marine biology textbook rather than a field guide.

The choice of specimens and the reproduction of the colour plates are, on the whole, good and not only make the book more attractive, but are also very useful for a better understanding of the text. The half-tone plates are of a less high standard and suffer from inconsistent treatment in the information provided in the legends, where, in some, the species name is used, while in others the common name is all that is given. Worthy of special mention are the series of colour plates of anemones and the magnificent colour photograph of a flatworm showing much of the internal anatomy.

In general the book achieves its stated aims and despite the unavoidable errors through over-simplification, should prove to be of use in giving the novice some insight into the way of life of the animals and plants to be found on the seashore.

BRIAN J. SMITH,

Curator of Invertebrates,
National Museum of Victoria.

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Note change from Monday to Wednesday night for March Annual Meeting.

Honour to W. Roy Wheeler

We extend our sincerest congratulations to Roy Wheeler, on learning of the conferring of the M.B.E. upon him in the New Year Honours List—a fitting honour for a worthy person.

Author Index for Victorian Naturalist

With the completion of this index, all members are indebted to Mr. J. Baines for the amount of work which he has done to produce this most valuable index. It is in the form of a card system, which can be kept up to date, and will be placed in the F.N.C.V. library for reference by members.

F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield.
The 116 species known and described, and illustrated by line drawings, and 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis.
This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK, by J. R. Garnet.
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General Meeting *13th January 1969*

About 100 members were present and Mr. E. R. Allan presided.

Christmas Greetings cards were displayed from the patron of the club, Sir Rohan Delacombe, Mr. Vic. Miller, the S.G.A.P., The Fauna Survey Group, and Ringwood F.N.C.

The Secretary announced that he had received the annual report of the Benalla F.N.C., and the second report of the World Wild Life Fund—an excellent publication. He had been asked to hand it on and spread the idea of Conservation. Separate copies could be obtained for $3, plus postage. The President read a letter from Miss Florence Smith—an honorary member—who said she had resolved to pay her subscription still, and enclosed $7.

Mr. Allan said the Victorian Cabinet had shelved the idea of the proposed restaurant in the Botanic Gardens because it was too expensive.

Mr. Hanks introduced the speakers for the "Members' Night".

Mr. P. Curliss discussed "Twins and Triplets" from *Cassia artemisioides* seeds which he germinated (after soaking) on blotting paper in plastic boxes where they were visible. The first to germinate put out three rootlets. Then three little shoots appeared above.

Another seed put out two shoots when the seed coat was removed, two distinct specimens were seen in the same seed coat.

After the cell in the ovule was fertilized by the pollen nucleus, the first divisions of it must have separated to produce distinct and separate embryo plants. One of the twins or triplets grew larger than the others.

Miss J. Forse showed examples of animal specimens preserved and prepared in a new way.

A small fish (after scaling) was soaked in alcohol, then in 1% potassium hydroxide for a week, making the flesh transparent. Then it was put in a dye to show the bones, and then in glycerine. The bones all showed up as clear red. A Japanese salamander (a prohibited import) was kept in the potassium hydroxide for 8 weeks before dyeing.

Fatty specimens are soaked in acetone first to get rid of fat.

Mr. A. H. Fairhall spoke of summer flowering native plants. He said that 2½ years ago the Council had appointed him to represent the club on the Committee of Maranoa Gardens, and for the first time he had asked a favour for some specimens to illustrate the talk. Most of the examples belong to Proteaceae and Myrtaceae.

Of the Proteaceae, grevilleas showed bright colours including *Grevillea robusta* (silky oak), *G. hilliana* (white silky oak), *G. sericea, G. banksii, G. asplenifolia,* the hybrid *G. poorinda constance,* and 18 other species of Grevillea.

Two banksias, *Banksia serrata* (Saw Banksia) and *B. speciosa* (W.A.), *Conospermum mitchellii* and a blue one from W.A., *Lambertia formosa* (Mountain devil or honey flower) N.S.W., *Lomatia ilicifolia, L. longifolia, L. frazeri,* and the N.S.W. *L. silaifolia* (Wild Parsley), *Hakea multilineata, Persoonia pinifolius, Stenocarpus sinuatus* which has been flowering since the nature show.

Of Myrtaceae, many melaleucas flowered in summer including *Melaleuca hypericifolia, M. laterita, M. longicoma, M. nematophylla, M. nesophila, M. thymifolia, M. pulchella, M. erubescens, M. squarrosa, M. ericifolia, M. pubescens, M. styphelioides, M. linariifolia, Callistemon speciosus, C. phoenicius, C. sieberi, Calothamnus quadrifidus, Chamaelaucium uncinatum, Darwinia citriodora, Eucalyptus ficifolia, E. torquata, E. tetraptera, E. desmondensis, Kunzea sericea, Regelia inops, Astartia fascicularis, A. hederanthera, Baeckea virgata, Leptospermum citratum, Beaufortia sparsa, B. eriocephala.*

Species of other families included *Istoma axillaris, Bursaria spinosa, Brachychiton populneus, Westringia glabra, Viola hederacea, Anigozanthos flavida, A. pulcherima, A. rufa.*

Most of the above were exhibited in flower.

Mr. A. J. Swaby spoke of modifications of the carrot family—Umbelliferae (or Apiaceae), and these were illustrated by projected slides—the family having typically a compound umbel and the two fruitlets (mericarps) pressed together.

The little native carrot and the Alpine celery (Aciphylla), the *Trachymene humilis* on the high plains, the flannel flower with its tightly packed umbels surrounded by flannel-like bracts, the little water plant, *Hydrocotyle muscosa,* the Southern Cross plant of W.A., and the "blue devil" all showed umbels.

An extreme modification in the Rose family was illustrated by the bidgee

widgee which has clumps of hooked fruits.

Mr. T. North showed "Remarkable Rocks" on Kangaroo Island. Most of the island is sandstone and limestone, but there is granite on one end, and on it these remarkable rocks showing stark irregular angles and curves like giant bites having been taken out of them.

Miss P. Carolan spoke of a trip to Central Australia, and showed a view of the Alice Springs Lake and young river red gums (*Eucalyptus camaldulensis*) in three stages of growth after three good seasons of rain—one stage 2 ft. high, a second stage a inches high, and tiny purplish newly germinated ones in thousands in Trephina Gorge. Another picture showed the shapely bellfruit tree (Codonocarpus) which is growing "like weeds" in Central Australia. It is short lived and bowed down with the weight of its fruits on top.

A beautiful slide of a desert oak showed a thick carpet of wild flowers under it.

A pet baby dingo was considered by the owners to "be alright because they had no chooks".

Semi tame pied butcher birds, bower bird and bower, aborigine ochre pits of soft rock for the yellow and red drawings, some horizontal and vertical parallel line drawings in Emily Gap, and other kinds showing nicks out of the rock probably indicating direction signs near Ross River, were all illustrated by fine color slides.

Mrs. North described an aborigine cave near Myrtleford which she saw while passing through a farm (with permission) about five or six miles N.W. of Myrtleford to the edge of the State forest. The cave was found about 10 years ago. It is a granite rock overhung and shows human figures and birds' feet.

Mr. Eric Allan showed pictures of Phillip Island, of the area—The Nit—where there had been a proposal to build a hotel motel, and which would have involved the destruction of the mangrove swamp which is a fine breeding place for water birds. The Rhyll Swamp breeding ground is protected by the Fisheries and Wildlife Dept. and is surrounded by a dog-proof fence.

He showed other pictures taken at the Nobbies including sea hares, one a dark one with a light one attached to it, a mutton fish (Haliotis), a rock with sea elephants, sea stars, tube worms and sea urchins, and a brittle star. A slide of seal rocks showed a great population of seals where six Fisheries and Wildlife officers are studying them.

Miss Jean Woollard spoke on "It is 1969". She stressed the need to preserve trees and vegetation generally and their connection with the essential oxygen supply. Fine pictures included snow gums, Aciphylla with insects, Rocky Valley Dam in autumn, Candlebark trees, shrubs on the Anglesea Coast, fern gullies, trees at Bulga Park, the entrance of the Darby River and the Tongue Point at the Promontory.

Mr. Ian Morrison showed excellent spider pictures including a jumping spider eating a housefly, the golden orb web spider and web, and a wolf spider for which he drilled a hole in his lawn. The spider took possession and made a silky lining and then a mat of gossamer outside the hole and on it laid 40 or 50 eggs and rolled it around to make a sac which she periodically held up to the sun.

Mr. A. E. Brooks described with beautiful slides the W.A. Christmas bush —a partly parasitic tree, the roots of which pigs dig up to get the milky sap.

Red kangaroo paws at Esperance, a red flowering gum, The Christmas bush at Tanjil Bren, and snow daisies 4000 ft. on Mt. Baw Baw. Brighter pink Trigger plants and orange billy buttons were characteristic of the heights.

Miss May Moon brought slides of the wattle at the Whipstick, plover's eggs camouflaged on the ground, Umberumberka river gums, Mulga ants' nest between the Olgas and Ayers Rock, Sundew devouring moths in the water on rocks at Katherine Gorge, rock paintings at Katherine Gorge, and a Gannet sanctuary at Cape Kidnappers, Hawkes Bay, N.Z., with 4000 nests. At sixteen weeks of age, they set off for Australia. They have been found in Australia eight days after banding in N.Z.—a journey of 1500 miles. She also showed a beautiful *Rhododendron lochae* in her garden, and a messmate with the glow of sunset in its upper branches.

Eckberg's Nursery has asked if anyone in the club has raised ferns from spores.

Exhibits

Mrs. North—Polished Beach Stones from N.S.W. near Newcastle.

Miss North—Fossil Shells from Warding Island.

Mr. Lewis—Fossil Wood from W. Tree.

Mr. A. E. Brooks—*Sollya fusiformis* Syn *S. heterophylla* (climbing bluebell). *Marianthus erubescens* (W.A. climber). *Hibiscus huegelii* (lilac hibiscus W.A.). *Correa decumbens* (S.A.).

Mr. A. J. Swaby—*Goodenia elongata* (Lanky goodenia, common around Melbourne). *Pratia surrepens* (a pollen plant and a seed plant). *Hydrocotyle muscosa.*

Mr. A. H. Fairhall brought specimens of most of the summer flowering natives referred to above.

Mr. D. McInnes brought two stereoscopic microscopes and showed rock sections and sori of fern in stereoscopic polarized light. He hoped that the club may procure three of these stereoscopic microscopes if members agreed they were useful. He also showed fossil leaves from Ten Mile Creek at Narracan.

Mrs. Woollard drew attention to 3AR repeat broadcasts at quarter past ten on Thursday nights on the wildlife of Eastern Australia.

Mr. Lewis stressed the need to protect the promontory in the Botanic Gardens Lake by mass pressure from people.

Mr. J. Strong suggested that a letter of congratulation be sent to Mr. Roy Wheeler on the award of the M.B.E. The President said it would be sent.

Mr. J. Ros Garnet said that through pressure by the Fauna Protection Council, the head bounty on the wombat was removed for three years as an experiment. It is now time for members to press for the removal of the wombat from the list of vermin. The control of the wombat should be a function of the Fisheries and Wildlife. He asked that the Minister of Lands be written to, suggesting the entire removal of the wombat from the list of vermin.

Mr. J. Baines said that not long before Mr. Coghill handed over his material to the new Secretary he mentioned that three men had compiled a list of all authors to the "Naturalist" up to 1953. He handed the list to Mr. Baines who has been gradually bringing it up to date to this year. He has put it in the Field Naturalist Library in the form of a card index for reference by members. He found a vast list from 1884 to today including many wonderful naturalists. He then read out the numbers of contributions that many naturalists had been listed with.

The President expressed appreciation to Mr. Baines for this splendid work.

Mr. Garnet reminded members that in former days Mr. Colliver would have "At Homes" getting the index together.

Marine Biology & Entomology Group
2nd December 1968

The meeting was chaired by Mr. Condron, 23 members being present.

Mr. McInnes reported that he had recently visited Kilcunda in the Gippsland area, and thought that it would be a suitable beach for a marine biology excursion at a future date. It was decided that the Secretary obtain information as to suitable tides in February and March, and that Miss Allender, Tours Secretary, be approached with the suggestion that a Club outing be held in that locality some time early in the new year.

The chairman announced that this Group would not meet in January 1969. Next meeting to be on 3rd February, which will be a members' night.

Mr. Strong reported on an outing he had made with the Underwater Research Group, who are making an ecological survey of Westernport Bay. A rare species of seaweed, Claudea Elegans, was obtained. Mrs. Watson, Secretary of the above Group, said that so far this species had only been found in Westernport Bay, Vic.; The Tamar Estuary, Tasmania; and The Bay of Bengal, India.

EXHIBITS

Mr. McInnes showed, under his microscope a bright-red species of Briazoa, showing the polyps extended, and some species of Ascidians. He gave a short talk on both. Also a species of Arachuida, Order Pantopoda. Mr. McInnes explained that all species of this family were marine, and are found crawling slowly over seaweed.

Miss Forse showed a fish preserved in alcohol, stained, and then immersed in a mixture of glycerine and water. It was transparent, thus enabling its bone structure to be studied.

Mr. Condron gave a short talk on an entomological excursion he had made to Frankston, when he collected some species of Hesperidae (Skipper butterflies), and also some Caper Whites.

Mrs. McInnes showed a species of spider, and a species of moth, both unidentified.

Mrs. Lee showed a species of "Sealouse" taken from the mouth of a fish.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10 February—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Amendments.
2. Correspondence.
3. Subject for the evening—"Echidnee". Dr. E. M. H. Ealey.
4. New members

(a) *Ordinary*:

Mrs. M. I. Hampton, 8 Station Street, East Kew 3102.
Miss Isobel Burns, Flat 9, 70 Hawksburn Road, South Yarra 3141.
Mr. Denis R. Penton, 43 Duke Street, Richmond 3121. (Interest: Conservation of native fauna and flora.)

Joint Ordinary:

Mr. and Mrs. F. R. B. Denton, 5 Albert Jones Court, Eaglemont 3084. (Interest: Australian flora and fauna.)

Country:

Mr. R. A. Young, Sheans Creek, Via Euroa, Vic. 3666.
Mr. Ian Staples, Parada Research Station, P.O. Box 60, Mareeba, Q'ld. 4880.
Mrs. J. Roche, 79 Clive Street, Shepparton, Vic. 3630.
Mr. A. Heislers, Forests Commission, Daylesford, Vic. 3460.

5. General Business.
6. Nature Notes and Exhibits.

Wednesday, 12 March—Annual Meeting with Presidential Address.

F.N.C.V. EXCURSIONS

Sunday, 16 February—Kilcunda. Marine Biology and General, leaders Mr. D. McInnes and Mr. J. Strong. The coach will leave Batman Avenue at 9.30 a.m., fare $2.00. Bring two meals.

29 August-21 September—Western Australia. As sufficient members have shown interest in this excursion to make it possible, bookings will now be accepted. Will members who have given their names tentatively to the excursion secretary please confirm them, and send a deposit of $50.00 by 20 March. After this date any unconfirmed bookings will be removed from the list, and bookings taken from members who have not already indicated a desire to join the excursion. Details of the excursion will be published later, but the plan is to go as far as Northampton, then down to Albany, across to Busselton, and back to Perth. Travel will be by train to and from Perth, with a chartered bus for the tour in W.A. Accommodation will be mainly on D.B.B. basis, and members will be responsible for their own lunches. At this stage it is impossible to give a definite cost for the excursion, but it should be approximately $260.00. Bookings should be made with the excursion secretary, Miss M. Allender, 19 Hawthorn Avenue, North Caulfield 3161; and all cheques made payable to "Excursion Trust".

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated.)

Thursday, 13 February—Botany Group. "Nature in Sth. Africa"—Mr. W. Woodman.

Wednesday, 19 February—Microscopical Group.

Friday, 28 February—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 3 March—Entomology and Marine Biology. This meeting will be held in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Wednesday, 5 March—Geology Group.

Thursday, 6 March—Mammal Survey Group at Fisehries and Wildlife Department.

Friday, 7 March—Junior Meeting at Rechabite Hall, 251 High St., Preston.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

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Vice-Presidents: MR. JEFFS, MR. T. SAULT

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Hon. Treasurer: MR. D. E. MCINNES, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: MRS. N. E. LEWIS, 1 Billing Street, Springvale 3171. (546 4649).)

Sales Officer: MR. B. FUHRER, c/o National Herbarium, The Domain, Sth. Yarra.

Group Secretaries:

Botany: MISS M. BUTCHART, 23 Loch Street, Hawthorn East 3123 (82 1616).

Geology: MR. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House. Melbourne 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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F.N.C.V.

the VICTORIAN NATURALIST

Vol. 86, No. 3 March, 1969

Published by the

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The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

F.N.C.V.

Vol. 86, No. 3 6 March, 1969

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Front Cover:

The editor took this photograph of the Bulldog Ant at Kiata, while on hands and knees, surrounded by at least a dozen of the same species. However he was lucky enough not to be stung.

The Wombat

by Dr. E. M. H. Ealey

Where farmers have gone to the trouble of eradicating rabbits and the expense of excluding them with wire netting fences, wombats can most certainly be a nuisance. They break through a fence like a small tank and allow rabbits to have entrance. There is no doubt about this in some areas. Therefore there is a case for controlling wombats where they are a nuisance. We cannot argue against this.

In order to assist in control, local councils subsidized by the Government paid a bonus of $1.00 on each wombat scalp presented to them. Each year 7-8,000 scalps were collected. This bonus has been removed for a trial period of two years. It will automatically be reimposed on 22nd May 1969 unless further legislation is passed.

There are two ways of killing wombats:

(1) Heavy steel jawed traps are set at the entrance of wombat holes or on their trails. The wombat is held by the leg which is often broken until the trapper returns. This may be a week later. In the meantime the wombat has died of heat stroke, thirst or simply pain and misery. This is the method generally used to collect the ears and scalp for which the bonus is paid. These traps are also known to catch dingoes, foxes, wallabies, kangaroos, lyre birds, echidnas, etc.

(2) Wombat burrows are fumigated with chloropicrin, cyanide or carbon monoxide. Although this method cannot be said to be kind it is by no means as cruel as trapping. The Lands Department is attempting to discover a more humane method of fumigation. It is far more efficient as there may be up to six wombats in a burrow.

In Europe farmers construct a swinging gate to allow badgers to pass through a fence. A few Victorian farmers use this technique. By placing a heavy swinging gate at a hole which wombats have made in a fence, they have prevented further damage. Mending the hole simply means the wombats make other holes somewhere else. This technique could be tested further by farmers with the interest, time and money.

There is evidence, as yet inconclusive, that dingoes in some areas depend on the wildlife killed in traps. The evidence for this is found in dingo stomachs. Wallabies, wombats and other wildlife caught in traps set for wombats would certainly add to the diet of dingoes.

Results to date suggest that there are at least 500,000 wombats in Victoria. According to one wildlife expert perhaps 2,000,000. We cannot argue therefore that the 6-8,000 killed each year will in any way damage this population. It certainly will not. However, we must demonstrate the uselessness of the bonus system.

First, a few remarks about the properties of animal populations. The numbers of most populations are usually regulated by the actual density. If the density gets too high some factor depresses reproduction and/or increases mortality. Clearly, if there were 400,000 adult wombats in Vic-

toria and all the young (say about 200,000) survived each year the numbers would soon be astronomical. A few farmers have visions of them swarming across their paddocks. Some species breed up to a critical density and then crash when disease or starvation causes widespread mortality. This occurs in some kangaroo populations and maybe among wombats. If enough of the animals are periodically killed a critical density is never reached and a higher overall density is maintained. If too many are killed the population declines, sometimes to extinction. This general hypothesis has been demonstrated in many sorts of animals and has two main applications.

1. In game management or fisheries it can be calculated what percentage may be taken each year without damaging the population. This depends on litter size, rate of growth, age of maturity and natural mortality. In some deer populations in North America 15-20 per cent can be killed each year and the population remains stable. With some animals 50-80 per cent can safely be killed each year e.g. rabbits.

2. In vermin control the same principle applies. If the vermin species had the same biological properties as the deer just mentioned, money paid on bonuses for 15-20 per cent of the population would be *absolutely wasted*. The population would adjust its reproductive rate and/or survival rate slightly and so compensate for the loss. Bonuses on wombats accounted for less than one per cent of the population. The more intensive trapping that was carried out near farms was in many cases little better than "culling" as it was not efficient. Thus in some places a more vigorous population was maintained where it was least wanted.

Let me present the arguments against and for bonuses, making special reference to the wombat.

Arguments against the bonus system:

1. There is a strong tendency for bonuses to become regarded as the actual destruction method instead of only an inducement for others to assist.
2. Any bonus payment system is an open target for fraud, misrepresentation and exploitation of an animal.
3. The higher the bonus the more it pays trappers to concentrate on individual pests instead of mass destruction techniques.
4. Overseas experience over many years has proved the failure of bonuses.

In regard to the wombat:

5. Much time is lost returning to traps to secure scalps. This time could be spent fumigating burrows in other trouble spots.
6. A trap at a burrow catches only one wombat. A burrow may contain six wombats which would be killed by fumigation.
7. Trappers often seek only dense populations. As soon as the law of diminishing returns applies, other populations are sought while the former may quickly recover.
8. It is well known that some trappers operate far from trouble spots simply wasting public money and giving the Lands Department an odious reputation. It is my opinion that wombats never move more than two miles from their burrow. This would be normal for an animal of this size.
9. Payment for destruction of a *native* animal is most distasteful to many in the community. Overseas people are appalled when they find out about it.

Arguments by those in favour of bonuses:

1. If the bonus system is dropped there will be no check on the increase in wombats. (There is much evidence contrary to this; see above re natural checks on animal populations.)
2. Bonuses are an incentive to employees to carry out more destruction work than they would normally do. (This would still be inadequate to outstrip recruitment to the population and employees simply go where the wombats are dense.)
3. Every scalp is evidence of one pest less. (It is only evidence of one killed, another will survive and take its place. If it came from more than two miles from a trouble spot it was a waste of time and money.)
4. Bonuses are better than nothing. (There is seldom evidence that bonus payments are ever made on enough scalps to change the population.)

In short, the bonus system is a *waste* of taxpayers' money as it is most *inefficient* and it leads to excessive *cruelty*. Where the wombat is shown to be a pest the complaints should be dealt with promptly by the Lands Department who have competent experts.

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Tomlinson, A. R., 1957. Bonuses for Vermin Control. Vermin Conference, Perth 1957.

Young, S. P., and Jackson, H. N. T., 1951. "The Clever Coyote."

The F.N.C.V. is against the bonus as a form of control. We feel that the removal period has proved the ability of the Vermin and Noxious Weeds Board to deal with complaints of fencing damage by treating each case on its merit and sending staff to deal with the problem. This is control as it should be by the Department concerned.

Your support is now required. Write to the Minister for Lands, Hon. J. McDonald and make your views known.

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Conservation by Cultivation

(Notes on a talk given at the La Trobe University to the Conservation Society.)

by T. E. George

On a scorching day in October 1937, a young country schoolteacher watched the stocks, wallflowers, linarias, and pansies wilt and die in his school garden, simply because he did not have a water supply at the school to keep the plants growing during dry weather. Only a few miles north of the Yanac State School, in the sand of the Great Desert of Western Victoria, the native plants were thriving and blooming under the very same scorching conditions that were causing the death of the plants in the school garden. On that day emerged the idea that native plants would be suitable for growing under the drought conditions that existed in many schoolgrounds for much of the school year, and practically all of the long Christmas vacation. During my seven years as Head Teacher of that little country school (for I was that disappointed young teacher), I studied the desert plants, collected seeds and seedlings, and grew many successfully in the school garden. Soon I was able to supply many other schools in the area with plants for their school grounds, and by 1942 was sending trees in tins free of charge except for freight to all the schools in the Wimmera and Mallee, if they wrote and asked for them.

105 out of the 145 schools in the Horsham Inspectorate received free trees from the Yanac State School in those few years. Many of those country schools would now be closed, but it would be very interesting to find out how many, if any of the trees have survived, and how much interest in our Australian plants was aroused by my enthusiastic advertisement of the much-maligned "scrub" which had to be cleared before payable crops could be grown.

Many different and beautiful plants were collected in the Great Desert, the Little Desert, the Lawloit Hills, around Lake Hindmarsh, and along the many bush tracks throughout the area. A record was kept of all the plants found, and all were identified by the botanists at the Melbourne Herbarium.

When I was promoted to Reservoir in 1944, I brought many native seedlings with me to find out how these plants would grow under ideal conditions of higher rainfall and an assured extra water supply in summer if needed.

I was the fortunate purchaser of a home, on a half acre block of good sandy loam, and during the past 24 years have grown many thousands of native shrubs and trees in my backyard nursery primarily to establish a native Botanic Garden of my own, in order to learn as much as possible about our plants so that I would be able to pass on my knowledge and enthusiasm to children and teachers.

My main aim was to grow as many different varieties as possible, so that the best could be chosen and grown in small areas to show off their beauty.

This is possible to some extent in school grounds, but more particularly in public parks and gardens where permanent staffs allow some continuity of care and attention.

When the late Reg Edwards, of Sydney Horticultural fame wrote in

1946, that in a tour of five states he experienced the greatest difficulty in finding workers who were more than casually interested in the preservation of native flower shrubs and trees. Further to this he added that there is a much wider field for research, collection, propagation, and eventual distribution of seeds and plants of our wonderful native flora.

From this, I ventured to suggest to him that he had not visited the Victorian State Schools' Horticultural Society's Nursery at Hughesdale, where under the leadership of the late Mr. E. F. Murnane a splendid effort was being made to inculcate a love of our own Australian flora in the minds of our school children at their most impressionable age.

The lack of interest in Australian flora was caused by the difficulty experienced in trying to transplant them from natural conditions to garden conditions. The result was that many were doomed to extinction from the very first settlement in Australia.

My main schoolground plantings during the past 24 years have been done in the northern suburbs at Keon Park State School, Preston North-east State School, and Newlands State School where I have been teaching. But many other schools, colleges, seminaries, and even Fairlea Women's Prison have received donations of Australian trees and shrubs from my nursery.

Within two years in 1956 to 1958, the Keon Park schoolground was transformed from a sea of mud to the most improved schoolground in the Preston Inspectorate through large scale planting of Australian shrubs and trees all of which were grown in my nursery, and all donated to the Education Department.

Although plants from every state in Australia are represented in this large scale planting at Keon Park State School, the Grampians and eastern Australia had most representatives.

During these years many trips were made during holidays, to the Grampians in particular, to collect seeds and seedlings. Some of the very successful Grampians wildflowers grown at Keon Park included several Thryptomenes, the Grampians Gum, the Snow Myrtle, and the Purple Kunzea. During my four years at Keon Park State School the Head Teacher, Mr. J. E. Hall (who was a past pupil of Mr. A. J. Swaby, founder of the Growers of Australian Plants), and I were privileged to be invited to be foundation members of the new Society of members who would do their little bit to help preserve our heritage by cultivating Australian plants in their own gardens.

The school garden at Preston North-east State School has a greater variety of plants from all states, and planting all around the schoolground has been very successful. The greater distance allowed between plants has been responsible for better development of each individual plant, and all should eventually be able to be seen to advantage without any overcrowding, as happened at Keon Park where provision of a shelter break from cold north winds was our prime necessity. This shelter belt was achieved very quickly by planting close together.

The schoolground at Newlands State School was even more ideally suited for showing off our plants to advantage, as the school buildings were situated at a greater distance from the streets. After the initial boundary planting was finished, specimen plants of many different varieties were strategically placed in order to show them off to advantage when in flower. In this way we hope to eventually have a miniature Botanic Garden at our own school.

Several of the Western Australian wildflowers grown from seed, collected during three months' long service leave taken for this special purpose (to learn more about our plants and to collect seeds and specimens for pressing), have already flowered at the Newlands State School.

The Western Australian expedition of 8,000 miles, during which more than one thousand different wildflowers were collected, not only for myself, but also for Melbourne Herbarium, Western Australian Government Botanist Mr. Royce, retired Government Botanist Mr. Charles Gardner, and Dr. Grieve, Professor of Botany at the Western Australian University, was undertaken during the months of September, October and early November 1963.

I have written a 22 chapter, 60,000 word book on this expedition, called *Wildflower Hunting in Western Australia*, which I hope will be of some help in the conservation program if accepted for publication.

The Education Department seemed to be taking an interest in Australian plants and their conservation, which was evidenced by the essays set for the examination in Botany II for teachers, over the years from 1959 to 1967. In 1959 "The distribution of native plants in Australia, with particular relation to rainfall." was the essay set for discussion. Then followed:

1963 The contribution of native plants to human welfare in Australia.

1964 Are our Australian native plants worth saving?

1965 The growing of native plants in a school garden for teaching purposes.

1966 What steps have already been taken, and should be taken in the future, to prevent the disappearance of the Australian flora?

1967 The need to conserve the native flora of Australia, and how this can be accomplished.

Coburg City Council asked for advice on planting a special reserve in Sydney Road, with Australian plants. As the council has been very good to the school, I had very great pleasure in asking if I could donate the trees for planting the reserve, as I knew that they would receive more attention from trained garden staff than even enthusiastic teachers and children can give them. Some of these have already flowered. Some died during the drought and are to be replaced, and *will* be replaced until the reserve is fully planted with Australian plants.

As Kodak Australia have also been of great help to the school I asked if I could provide Australian plants for a special section in their grounds. My offer was accepted, and the plants are growing extremely well under the excellent care of the garden staff. This voluntary work over so many years has meant a great deal of work and expense in collecting seed, tins, and soil, as well as excess water rates; so I asked the Education Department for permission to sell excess stock in order to defray expenses. The answer received from the Department was that they considered what I was doing was a hobby, therefore I did not need permission to sell . . . The small charge of 40 cents for plants in pulp tins helped me to defray expenses, and the all clear given by the Department allows me to carry on the work I am doing free from an uneasy feeling of breaking regulations every time I sell one plant for every dozen I have given away.

The Country Roads Board has already used many of my trees to plant nature strips in front of the aerodrome,

along the Hume Highway, and the Tullamarine Freeway. This year, 1968, my offer of a dozen Australian shrubs and trees to all the schools in the Reservoir Inspectorate has been widely accepted and appreciated. I would like to be a man of independent means to be able to supply thousands of trees so that they can be widely grown and admired. I have the seed of numerous varieties of Australian plants, the knowledge and the ability to grow them in thousands for wide dissemination. I have thousands of plants growing in containers large and small, ready for planting out or for exhibition purposes. I have a pressed collection of many thousands of Australian plants, mounted for show purposes, also seed capsules for teaching purposes. I have many hundreds of large plants in large tins, two and more years old proving that they can be grown in containers for exhibition purposes. Many of these large plants are still unidentified from the Western Australian trip and are known only by a number such as Melaleuca purple 1. These advanced plants are being sold for $2 if anybody needed to establish a garden of Australian plants in a short time, but the small plants are best for growing stronger, particularly in places subject to heavy winds.

I had hoped that many of my plants would be used at the University to provide a Botany section in the gardens, as four members of the Botany staff were very impressed with both growing and pressed collections of plants. But I have seen the overall plan of the university grounds, and although many Australians are being used, many will grow too large and shady to allow the smaller Western Australians to flower as prolifically as they do when given plenty of sun. However if a special section is devoted to the lower growing plants they will flower well, and if some lawn specimens are allowed to be grown well away from the larger trees the number of different varieties could be increased considerably. The available garden area at La Trobe should be able to allow a special section for conservation purposes. It is in reserves such as these where we could have a sure and attractive way of preserving our plant heritage. Preservation or conservation by cultivation should be our watchword. I would like to plant out many of these reserves so that our plants can be seen in their full glory. If the Americans had such a wealth of flowering shrubs they would concentrate them in parks and tell the world to come and see them. King's Park in Western Australia was granted $66,000 a year for five years to concentrate the best of the Western Australian wildflowers in a special area in the park. Why can't we have one at La Trobe?

* * *

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Aboriginal Campsites on Wyperfeld National Park and Pine Plains Station

by Aldo Massola

Introduction

The Wimmera River, discovered and 'lost' by Major Mitchell in 1836, was rediscovered by Eyre in 1838, who traced its course to, and named, Lake Hindmarsh. What followed is history, and in this paper we are not concerned with re-describing the vicissitudes of exploration, and the hardships suffered by the settlers who followed in the explorer's footsteps. Their bravery and courage has been justly praised already many times, and by worthier pens than mine. What I propose to do instead is to place on record the findings of a small party, of which, in a sense, I was the leader but not the guide nor the organizer. I simply stated where I wanted to go and I was taken there.

Our purpose was to locate, in the singular country at the end of the Wimmera River system, traces of the aborigines; and thus be in a position to either confirm or to deny the veracity of a number of 'stories' claiming that this hard-to-get-to region was an aboriginal 'centre'.

The organizer and guide—the man who did all the work—was Mr. Ron P. Falla, a farmer and conservationist of Litchfield. The third member of the party was Mr. Falla's young son, David, who, I think, had the time of his life; and, on our trip to Lake Wirrengren, at the very end of the Wimmera system, we had the good fortune to have the company of Dr. R. Frazer, the noted naturalist, and of Alec Campbell, the Ranger of Wyperfeld Park. His knowledge of the country through which we travelled, and of its flora and animals is astounding; and I wish to state that he helped considerably in ensuring the success of our expedition. He had also laid his foundations well, by advising Mr. O'Sullivan, the owner of Pine Plains Station, of our intended visit; and that 'King of the Wilderness' received us most hospitably, and personally acted as our guide through his vast domain.

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The Wimmera River

The Wimmera River rises in the Pyrenees and flows north-west to about Natimuk, where it takes an abrupt due-north turn to Lake Hindmarsh. The river, it is well known, often does not run at all, or it may be reduced to a series of muddy waterholes. At other times it can run with the impetuosity of a mountain stream, and flood the country for miles around. As a result Lake Hindmarsh either dries up and traffic takes a short cut across its bed, such as in 1902, 1906, 1929 to 1932, 1945 to 1951; or the lake fills and overflows. The water then runs north through Outlet Creek to Lake Albacutya, and, on rare occasions or in very abnormal seasons, overflows from it also, and continues north, filling one after another fifteen or so small and large depressions before reaching Lake Wirrengren, or Wirrengren Plain.

All these depressions are named, and are referred to as 'lakes' or 'plains' or 'flats' irrespective of whether dry or otherwise. The most southerly ones contained water between 1911 and 1915; and in 1918 the water actually reached Lake Wirrengren, for the first time in living memory. (The previous occasion was in 1852, when there was fifteen feet of water on the plain.) The 1957 floods put four feet of water on Black Flat, in Wyperfeld Park, but it did not go much further north.

The country through which Outlet Creek runs is undulating, and consists of either white sand, covered with open to dense mallee scrub, with an undergrowth of myrtles, spinifex, pine-scrub, dwarf casuarina, and banksia; or of red sandy clays supporting a dense vegetation of tea-tree, acacia, and myrtle bushes. Everywhere there are small flowering shrubs, and from the top of the higher sand ridges, as far as the eye can see, there is an extraordinary view of a sea of dark green; the wild monotony being only broken by glimpses of sand on distant ridge-tops and by the few scattered native pines towering above the scrub.

Everywhere on the sand there are tracks of wallabies, kangaroos, emus, reptiles, and small birds; and, occasionally, of rabbits and foxes. By proceeding quietly many of the track-makers may be seen. The most displeasing sight was the tracks of a domestic cat gone wild; this being the most blood-thirsty and destructive animal found in the Australian bush.

The bed of Outlet Creek is a well defined channel of varying width and depth, meandering through the maze of dry lake and lagoon beds, and is flanked on either side by high sand dunes. The dark soil of the creek-bed supports a profusion of red-gum and black-box trees, some of which must be of considerable age; and is covered by a luscious growth of grass, which, in normal seasons, reaches to a man's arm-pits. The creek-bed and the 'flats', thus stand in sharp contrast to the surrounding desert. It is like the proverbial oasis in the scrubby wilderness.

The River and the Aborigines

Before we proceed, it may be as well to examine the possible ways this fascinating region was reached by the aborigines when converging on it for their periodical intertribal meetings.

For the southern tribes the obvious way was to follow the course of the Wimmera River. This route is in fact marked by conveniently placed campsites, to be reached by the end of a day's march. Beginning from the large one near Horsham, and travelling north, there is a camp at Reedy Swamp, south of Dimboola, another near Antwerp, and a third, a large one, on the sand dunes on the eastern side of Lake Hindmarsh. The next stop was Lake Albacutya, and then the campsites in the present Wyperfeld Park were reached.

Yarriambiac Creek was an alternate route for the southern tribes. Campsites along this creek include the one just south of the Warracknabeal aerodrome, then proceeding north, one just north of Lah, another, south of Beulah, and then Lake Coorong was reached. From there the way to Wyperfeld was probably through Buroin. The tribes from Lake Buloke also went to Lake Wirrengren via Lake Coorong.

The Murray River tribes went to the meeting place by way of Gayfield, the Hattah Lakes, and Tiega or by way of Chinkapook, Lake Tyrrell, and Lake Coorong. The journey between Gayfield through Tiega, to Lake Wirrengren, approximately fifty-five miles, was done in two days; but it is likely that the southern routes were covered in a much more leisurely fashion. What made the difference, no doubt, was the availability or otherwise of water.

Though it is believed that there were small groups living in the mallee country to the west of the river system, their route to the meetings is not known. There are a number of small camps to the west of Lake Hindmarsh, notably at Sandsmere, Broughton, Yanac, Netherby and Lorquon, but whether these were on a recognized native track is not known to me.

Water did not present any problem to the aborigines, since they knew the whereabouts of native wells. These were

Wonga Lake Campsite.

photo: Author

Lake Agnes Campsite.

photo: Author

either clay-pans, which contained water in winter, or else soaks. The latter occur in poor sandhill country, and are probably clay-pans filled with drift sand. The natives sank shallow conical holes in these, and thus obtained water. The holes were then kept covered with sticks, both to minimize evaporation and to keep the water clean and protect it from kangaroos and wild dogs. Each of these wells had an individual name, and the natives knew which could be depended upon during the different seasons.

They also relied on the water stored in the roots of certain plants, such as the weir mallee and the needle-bush hakea. Both of these have long horizontal roots, only a few inches below the surface of the soil. After digging them up the natives broke them into short lengths and up-ended them, making sure that the end furthest away from the tree was on top. Good clear water soon dripped out; a root of from fifteen to twenty feet yielding between one and two pints.

Water was also obtained from the mallee oak. When over six inches in diameter the trunk of these trees is partly hollow and holds rain water, which drains into it through holes at the junction of the branches. The natives tied a bunch of grass at the end of a spear and dipped it into the holes. The grass acted like a sponge.

Crab-holes were a further supply of water, and it was obtained either by sponging it out with the spears, or by sucking it up through reeds, if these were available.

As a precautionary measure, when travelling in this country the aborigines carried waterbags, made by tying up the neck and leg holes of a fresh possum skin. They also continually chewed the tender tops of the native currant bush, which grew everywhere. The strong, yet pleasant acid from this shrub prevents the lips and mouth becoming parched, thus alleviating the necessity of drinking frequently.

Food was plentiful. As well as all manner of animals, both large and small, there was a profusion of seeds, nuts and edible roots.

Wyperfeld Park and Pine Plains Station

The first stop after passing through the rustic entrance to the Park is, of course, 'Wonga Hut'. This famous tin shed is well known to all who have visited Wyperfeld. What is not known is that on the 'tourist area flat', amongst the red gums growing at the foot of the sand dunes on the north-north-west of the hut, there is a tree exhibiting the characteristic scar left when bark for a canoe has been removed. A canoe tree in that position denotes water on the flat, and fish in the water, carried thither by the flood, to serve as a welcome change of diet for the aborigines.

Near-by Lake Brimin, of great tourist attraction because of its 'dog-leg' fence and its whim (the latter originally constructed on Wonga Lake to obtain water during the severe 1863-1865 drought) has no attraction for the hunter of aboriginal relics. If any existed on its banks they have been engulfed by progress, or long since picked up either by emus or by the tourists.

Black Flat, about three miles north-

west of Wonga Hut, is surrounded by sand dunes. A search on these revealed no implements or even stone, but scattered over a small compass on the sand dune on the west side of the flat there were about 40 fire scorched freshwater mussel shells. One can visualize a little group of women, who, having 'fished' for the mussels in the mud of Black Flat, retired to the top of the sand dune to eat them and whatever other delicacy they had collected, while the children romped about happily or slid down the sand on the sides of the dune like children all over the world do. All that has gone now, except our imagination and the mussel shells!

Lake Brambruk, about three and a half miles north-east of Black Flat, greeted us with a beautiful campsite. It is on the sand dune on the west side, and extends over an area of from 8 to 10 acres. Mussel shells and fragments of emu egg shell were plentiful, and so were chips and lumps of stone, mixed with stone implements, broken mill stones, hammer stones, scrapers and microliths. In all we 'bagged' 206 pieces, made from flint, conglomerate, vesicular lava, both fine and coarse grained sandstone, quartz, and chalcedony.

Our next call was at Wonga Lake, about three and a half miles north-west of Brambruk. This was the original place where the whim now at Brimin was built, and some of the structure remains on the dry bed of the lake. There is a campsite there also, on the sand dunes on the northern side, and from it we collected 352 pieces of stone, including a large proportion of used flakes, scrapers, microliths, and some lumps of red ochre. One beautiful discoidal microlith had been made by splitting a minute quartz pebble, of which it retained the 'cortex'. Other materials included chert, endurated limestone, quartz, quartzite, and chalcedony. One end-scraper was made of tekalite. On the creek-bed below the north-west dunes of the lake there is an old red gum canoe tree, with its base partly burnt by a bushfire, and its 'inner' badly damaged by white ants and borers, and currently falling out of the canoe scar. Soon it will be a hollow tree.

Lake Agnes, on Pine Plains Station, is about eight miles north-west of Wonga Lake, and has, on its south-east side, a 'blow', which exposed a clay bottom. Fragments of emu egg shell and mussel shells were plentiful on the clay, but stone was not. Only about 50 pieces were found, and the few implements amongst them were all microliths. Material ranged over quartz, quartzite, chert, endurated limestone and micaceous sandstone. A human burial had been exposed and scattered over a large area by the wind, and the brittle bones lay broken into fragments. Young David Falla found, and became the proud possessor of, a molar tooth.

On the slopes of Mt. Jenkins, a sand dune immediately north of Lake Agnes, which we climbed to better observe the lake, we found an old dead black box tree from which a shield had been removed. This tree is on the west side of the 'mount', close to the track to Lake Wirrengren.

Lake Wirrengren is a five mile by ten mile grassy plain about two miles north-west of Lake Agnes. Apart from the grass, the only other vegetation on this plain is one very tall red gum. This lake is the end of the river system, and despite rumours, no channel extension issuing from it has ever been found. On the western horizon from where we were there is a low sand ridge, O'Sullivan Lookout, and others on the north-east are known as Kelly's Lookout and Mt. Observatory, the latter a ridge which rises 368 feet above the surrounding scrub. What interested us most, however, was a 20 acre blow on the sand ridge on the east side of the plain. We could have collected all day upon it, but we contented ourselves with 'type' specimens, 161 pieces in all. These included utilized pieces and knives, both semi-discoidal and end scrapers, semi-discoidal and segment microliths, and broken mill and hammer stones, made from flint, chert, quartz, quartzite, chalcedony, and endurated limestone. There was also a number of limestone nodules and concretions scattered about on this campsite, and some baked river clay, obviously used by the aborigines to line their ovens.

Conclusions

This trip resulted in the locating, for the first time, definite proof of aboriginal occupancy of the country to the north of Lake Albacutya. It also served to verify the accuracy of an aboriginal legend which I was able to piece together from information received separately from a number of aborigines in different parts of Victoria. The legend was published in my book 'Bunjil's Cave', and cannot here be repeated in full. Briefly, it states that the Wimmera River was

originally the track of a kangaroo. It stopped a long time at Lake Hindmarsh, and a shorter time at Albacutya, and thus those two lakes were made. The kangaroo then went on in a northerly direction, and his tracks became fainter and fainter until they disappeared in the sandhills. This is how the Outer Channel was made. Then a triantelope, or huntsman spider, and his two daughters, followed the tracks, in an endeavour to escape from their enemies, the Bram-Bram-Bult, the two Bram-brams, who were two brothers famous for their magic. The triantelope camped at Lakes Hindmarsh and Albacutya, but the two brothers only caught up with them at the next campsite, Wonga Lake, where they killed the father and amused themselves by rolling his head from one to another, thus forming the lake-bed. The limestone nodules found on that depression, (and on no other in that river system) were the teeth which dropped out of the triantelope's head as it rolled about.

However, we found a campsite on Lake Brambruk, south of Wonga Lake, which had not been mentioned as forming part of the legend by any of my informants. A story widespread in the Wimmera district has it that this lake was supposed to have been named by Captain Morgan, the bushranger, after a favourite horse. It is claimed that Morgan was in the habit of bivouacking at this lake on his way to South Australia, to sell the horses he stole from settlers in Victoria.

It is a little difficult to believe that anyone could have chosen this route to go to South Australia; and I am inclined to think that Brambruk is a corruption of Bram-Bram-Bult, and that the campsite name forms part of the legend. The two brothers could well have camped at this lake just before attacking the triantelope at Wonga Lake. If there was any naming, then the horse was named after the lake.

However, to proceed. After killing the triantelope father the two brothers abducted the two triantelope girls, and took them to Lake Wirrengren. At this spot they decided the two girls were no good to them, so they speared them, and dashed out their brains and jaws with their waddies. This accounts for the many ('double' the number found on Wonga Lake because of the two heads) limestone nodules and concretions found at that campsite (and not on the lake-bed).

Apart from the legend there are several early records of the aborigines congregating at Lake Wirrengren. The name should be Werreng-jerren, and means 'noise as made from many people' i.e. from the tribes assembled there. Lake Wirrengren we found to have the largest campsite on the river system. This would testify to its importance. There is more proof: throughout this country there is no stone of any description to be seen. That found on the campsites must have all been imported. We may hazard a guess: flint from the coast west of Portland; vescicular lava from the Western District; sandstone from the Grampians; endurated limestone from north of Tailem Bend, in South Australia, chert from Western New South Wales, quartz and quartzite from Central Victoria. Nor must we forget that emus have the nasty habit of swallowing stones, especially the

Lake Brambruk Campsite.

photo: Author

Lake Wirrengren Campsite.

photo: Author

brightly coloured or the black ones, to help their digestion. No doubt over the last century, they have robbed the campsites of hundreds of beautiful specimens!

The dearth of large implements on these campsites can be explained by two reasons: (1), is that the further from deposits of stone the smaller the implements; and (2), over the years the local station owners have employed hundreds of hands, some for a very short time. All these people would recognize an axe or a millstone, and would 'souvenir' it, leaving behind the little implements because they did not recognize them as such. All this would suggest that the aborigines did congregate on this country for their intertribal meetings, where all kinds of goods and produce would be exchanged.

There is just one more point: Was there a permanent native population on these lakes? Most likely, but it probably was very small. We have only two records of this, but they should suffice, remembering that the white man still does not know the Mallee.

One is by J. M. Clow, who discovered and occupied Pine Plains in 1847. He referred to an aboriginal and his three wives and two children permanently living at Balarook, west of Lake Hindmarsh (just north of the present Broughton). The second reference comes from W. L. Morton, who visited Pine Plains in 1861. He stated that some of the natives then living at the station had, up to the previous year, lived for three and a half years 'in a wild state' in the neighbourhood of some salt lakes south-west of Pine Plains.

I feel that all the queries have been answered and that our expedition achieved all it set out to do; but we cannot leave the subject of Pine Plains without mentioning that Clow's original hut, made of hand-hewn timber and assembled without the use of nails by means of grooved cross pieces, and roofed with slats (covered with galvanized iron at a latter date) still stands, although it is not, of course, in the best of conditions.

For those who would like to see a real pioneer's hut, (Clow's) and a lonely bushman's grave (Joseph Everard's at Pine Plains, 1867); for those who would like to imagine the Mallee as it was, with its aborigines, with the tragedies of the early settlers (three-day old baby Cameron's grave at Wonga Hut) and, to see a type of country unique in the world, with its strange landscape, amazing flora, and beautiful birds and animals, I recommend the Wimmera River system. But before all, they have to be fortunate in finding a Ron Falla to take them there.

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Observations on the Sacred Kingfisher

by W. Perry

Splitters Gully is close to the southern boundary of the Whipstick. More than a century has passed since this area was "rushed" during the 1850's, but hundreds of shallow diggers' holes remain as evidence of former activity. A gold nugget weighing 270 ounces was unearthed here in 1868 by a lone German prospector, a "hatter", called Jacob.

Today this gully, except for bird calls or the ring of the wood-cutter's axe, is silent. Tall Yellow Gums (*Eucalyptus leucoxylon*) and Green-leaved Box trees (*E. microcarpa*) stand close together like sentinels guarding a rifled treasure house. The only gold to be seen here now is during August and September when Golden and Whirrakee wattles splash their colour across the landscape.

When I walked through Splitters Gully on 13th December, 1958, the bush was extremely dry. A pair of Sacred Kingfishers (*Halcyon sanctus*) flew around among the tall trees, one with food in its beak. This bird suddenly flew down an old mine shaft, and almost immediately flew out.

The old shaft, surrounded by a high mound of mullock had caved in. Inside was a miniature crater some twelve feet across and as deep. In the side of the shaft the Kingfishers had excavated their nesting tunnel. Descending the crater, I flashed a torch in the nest and counted four un-feathered birds.

I crouched hard against the side of the shaft, and shortly the parent birds resumed feeding. Brown cockchafer beetles comprised the main diet. On one occasion a large red centipede was brought in and slowly hauled in like a length of coloured rope by the fortunate recipient within.

When a parent bird brought food, it usually alighted on the same branch of a nearby tree, from where the interior of the shaft was in full view. It would then make a call which was answered with vigour by the nestlings. The clamour from the nest sounded much like that heard from a nest of young starlings. The exchange of food from parent to young was practically instantaneous, and on no occasion did a parent bird remain perched at the entrance of the nest. My presence only a few feet away may have accounted for this.

Deciding to attempt photography, I set up the camera on the fallen rubble and hoped the old shaft would not collapse further. Extending over a period of four or five mornings I obtained some reasonable photographs.

During this time some interesting observations were made.

This nest, like other nests of the Sacred Kingfisher previously observed, appeared unhygienic, with the odour being most unsavoury. With a small stick I scraped out some of the foul-smelling material from the floor of the nest. There were various parts of beetles and quite a number of live maggots. Flies flew in and out. Despite this filth the young birds did not excrete in the nest. Indeed, they approached the entrance, turned around and with some force ejected the excreta outside.

One morning the young birds were fed entirely on small skinks. Several times after a parent had delivered a lizard, I quickly crossed the shaft, and with the aid of a torch observed how the small reptiles were accepted by the young birds.

It was always the same. The parent bird grasped the skink in its beak by the throat, and thrust the head into the open mouth of the nestling. It was then impossible for the lizard to open its mouth. The small reptiles were swallowed whole. At first writhing violently, the movement of an unfortunate victim gradually eased as it was slowly swallowed, until only the tip of the tail remained. Then this would cease to move and with a final gulp all was consumed.

I was anxious to secure one of the skinks for identification. When one bird had been given a lizard, I was able to seize the tail, and after a brief tug of war, secure my specimen. I was amazed at the strength of the young bird. The "captured" specimen was three and a half inches long, and I considered it to be a Common Grass Skink (*Leiolopisma guichenoti*).

I had this nest under observation for several weeks, and on December 26th, all the young birds were present. On 9th January only two birds remained in the nest, and both appeared well feathered, and in my opinion ready for flight.

Three years later, on 15th January 1961, I again visited the old shaft. A pair of Kingfishers were nesting in a new tunnel some three feet from the old one and contained young birds.

When passing the same mine shaft on 5th January 1969, I stopped and inspected it for nests. A Sacred Kingfisher flew out of a nesting tunnel, a new one, which contained four eggs. By 15th January, all eggs had hatched, and on 26th January, the young birds were partly feathered. Just inside the nest entrance was a quagmire of excreta, some of it splashed outside and down the side of the shaft. A number of ants were roaming around inside the nest close to the entrance. I scraped out some of the filth which included maggots and the remains of a large spider. It has always puzzled me why such beautiful birds have filthy nests.

Over a number of years I have observed Sacred Kingfishers nesting in the sides of old mine shafts, close to the surface, and on one occasion in the mullock surrounding the mouth of the shaft. Certain localities in the Whipstick are frequented by Sacred Kingfishers almost annually. They are summer migrants that usually arrive in the Whipstick towards the end of October or in early November. They are never numerous, and nest during the Christmas-New Year period.

Red-backed Kingfisher

Although a bird observer for over forty years, only once has a Red-backed Kingfisher (*Halcyon pyrrhopygius*) been observed. This was on 8th October 1967, when a solitary bird was noticed perching on electricity wires at Woodvale, on the fringe of the Whipstick.

Cactus-flower Vigil

by A. G. Fellows*

The following incident occupied one hour of interest-filled attention by two people, as well as myself, all keen on witnessing the opening of a giant cactus blossom from a tightly furled fist-sized bud to a widely-opened flower with reflexed petals, covering the space occupied by my two hands placed side by side. At 7.00 p.m. the bud, though swollen greatly in the previous half hour, showed only a tiny amount of creamy-white between the outer petal edges. At 7.10 p.m. the very tips of the petals—twisted tightly until then—showed signs of untwisting, and at 7.15 p.m. a tiny aperture had opened in the bud's tip, a lead pencil just entering it. At 7.22 p.m. a little finger just entered between the now straightened petals, showing the stigma down in the throat.

At 7.28 p.m., two fingers were able to penetrate without touching the inner petals, while the outer petals were by now lifted, and reflexed well away from the inner ones.

By 7.35 p.m., an aperture showed measuring three inches across, each inner petal separating from its neighbouring ones distinctly, and a multitude of stamens coming into sight surrounding the stigma, but remaining in a ring close to the innermost petals. At 7.45 the flower's aperture was over five inches across between the ring of inner petals, the stigma standing erect, and the stamens separating and drawing nearer to the flower's centre. By now, the depth of the flower could be measured, and from the stamen bases to the inner petal tips showed five and a half inches. All outer petals were now flung right back, the golden interior of the stamen-mass contrasting with the satin white and cream petal exteriors. 7.55 p.m. showed a little wider spread of the flower in general, and at 8.00 p.m. the first nocturnal visitor in the form of a moth arrived. We had stood in awe watching the transformation, carefully timing each change as one or the other noticed it, and taking turns with our flash lamps to keep it under constant observation.

A gentle breeze had moved the flower from time to time, giving the impression that the flower's changing form was a conscious one, but until the hour had passed we did not speak; and then each realized the beauty of the sight called for some comment.

Several flash exposures on colour film have made a record of the flowers opening that evening. This happened a fortnight ago, and that opening bud proved to be the first of a series of rapidly developed buds; and one very recent evening after frantically gathering friends from far and near, at 10 p.m. we all gazed at *ten* widely opened flowers on a scraggy looking cactus plant, dubiously supported by a half-dead "china-apple" bush.

Incidentally, we have always watched this particular variety of cactus when buds formed, as however dry the weather and unlikely our rain signs might be, rain almost invariably does fall as the flowers *close* and never while they are in full display.

An early budding around Christmas time seemed inappropriate here. Two flowers opened at once. Two days later we received a light welcome rain. A *second* bud crop showed while the first flowers were swelling on the eve of their opening, something not seen here before. Then they developed and the ten flowers opened. Rain fell within 1½ miles of this place on the following night and further rain fell until the ragged wrecks of the spent flowers have been deluged only two nights ago. Examining the old plant today, I noticed a *third* set of fast developing buds in evidence. That means approximately ten day's waiting for further blossomings.

If this seems of little importance, why should the plant during some years fail to bloom at all, buds forming maybe, then rapidly turning reddish overnight, to be jettisoned by the plant forthwith.

No rain falls at those times here. Similar behaviour is seen in the so-called "Moonlight" cactus too, with its multitude of sweet-smelling flowers that also only open after dark and are shapeless ragged wrecks by 8 a.m. next day. Fleeting beauty maybe, but of never-ending interest to say the least.

* Charters Towers, Queensland.

Book Reviews

Australian Pond and Stream Life

By JOHN CHILD

(Published by Cheshire-Lansdowne in the Periwinkle series)

Lightweight cardboard cover, approx. 5" x 7¼". 99 pages and 15 pages of colour plates, with 18 half-tone plates and 35 in-text line drawings. Price $1.25.

This book sets out to introduce the beginner to the freshwater environment and some of the interesting forms of plant and animal life found in fresh water. It starts off by discussing the importance of water as the basis for life itself, and then gives the reader a look at the concept of ecology, a web of life with all the features of the environment in and around the pond interacting with each other. After a short description of the practical aspects of collecting freshwater life, the remaining 10 chapters are devoted to a detailed examination of the various forms of plant and animal life to be found in fresh water, ranging from the practically miscroscopic forms such as rotifers and hydroids, to the large water plants, the wide variety of invertebrates such as snails, insects and crustacea, to fish and tortoises. These sections give a very simplified picture of the various groups of animals and plants, of their major divisions and some brief idea of their mode of life. In some cases some attempt has been made to provide brief keys for identification down to family level. The information given is mainly accurate though some errors do occur mostly by over-simplification.

The colour reproduction in most cases is very good, but one or two of the pictures could have been chosen with more care, both from the point of view of the subject and the composition of the picture. Worthy of particular mention is the series of colour plates of frogs. Many of the half-tone plates were also of high standard, although the legends to both colour and half-tone plates could have been improved in many cases.

The book is plainly for the novice only, but should be of use in introducing him to the study of freshwater life.

BRIAN J. SMITH,
Curator of Invertebrates,
National Museum of Victoria.

Venomous Australian Animals Dangerous to Man

Edited by J. ROS GARNET

Published by Commonwealth Serum Laboratories

Approx. 9" x 6", lightweight card cover, 86 pages with 12 black and white illustrations. A folded chart showing classification of the Phylum *Reptilia* is appended at the back of the book. Price 95 cents. (Limited publication.)

The opening chapter is devoted to Marine Animals and includes Sea Snakes, poisonous and venomous fishes, Stonefish, the Sea Wasp, and the Cone Shellfish and octopus from the mollusc group.

Centipedes, scorpions, ticks and mites, and spiders form the venomous group of Anthropods; while Australian venomous snakes complete the book, with details of distribution and identification of the more important deadly species, and a good account of first-aid treatment for snake-bite. The treatment of general envenomation is given in the final pages.

This publication should not only appear on the naturalist's bookshelf, but should also find room in all homes to confirm suspicions or allay fears when bites or stings are encountered.

G.M.W.

Hawthorn Junior F.N.C.

Annual Report 1968

Office Bearers at 1st January, 1969:
President—Mr. D. McInnes.
Secretary—Susan Beattie, 2 Clyde Street, Glen Iris.
Treasurer—Jenny Forse.
Excursion Secretary—Ian Knox.
Editor and Club Recorder—Barry Cooper.

Membership showed a gradual but steady decline during the first nine months of the year, but has recently stabilized at about 130.

Meeting attendances have also averaged lower than 1967 with numbers fluctuating from 60 to 135 during the year.

Meeting and Topics in 1968:

26th January—Members' Holiday Exhibit Night.
23rd February—"Sandhoppers, Pillbugs, Fishlice" by Mr. W. Seed.
29th March—"Early Man in Victoria" by Dr. A. Gallus.
26th April—"The Building Stones of Victoria" by Mr. M. Coulthard.
31st May—"A Trip to Tasmania" by Mr. A. Lewis.
28th June—"Potoroos" by Mr. J. Seebeck.
26th July—"Native Pines" by Miss L. White.
30th August—Members' Exhibit Night and celebration of 25th Birthday.
27th September—"Frogs and their songs" by Mr. J. Loftus-Hill.
25th October—"Birds and their songs" by Mr. E. R. Allan.
29th November—"Flowers of the Victorian Landscape" by Dr. G. N. Christensen.

The meetings, this year, have been chaired by various junior members of our Council.

Excursions:

Saturday, 24th February—Rickett's Point (Marine Studies).
Sunday, 3rd March—Gisborne District (Graptolite Fossils).
Sunday, 31st March—Riddell, Hanging Rock (Geology).
Sunday, 28th September—Coimadai—Lerderderg Gorge (General).
Saturday evening, 26th October—Studley Park (Possum spotting).
Sunday, 1st December—"San Remo—Phillip Island" (Marine Life and general).

The Possum spotting excursion was an outstanding success. The attendance was one of the highest recorded, and 27 Brushtail and 13 Ringtail Possums was our tally for about one hour of spotting.

The San Remo-Phillip Island trip was the longest outing organized by the Club in recent years.

Publications:

Our monthly publication "The Junior Naturalist" has completed Volume 4. In February, it was improved with a new cover design, and the use of a more modern typewriter.

The production of additional publications was limited to: "Reptiles and How to Keep Them" by Tim Anderson, as the Club has supplies of other publications left over from other years. This booklet has already paid for itself through sales at the 1968 Nature Show.

Constitution:

In March, the Club decided to apply for postal registration of "The Junior Naturalist". As this was not possible without a Constitution, a special committee was appointed by Council to prepare a draft constitution, which was subsequently accepted by Council and the Club. Its preparation was aided by a drafted sample prepared by Paul Gahan. Postal registration was approved by the P.M.G. in November and our monthly magazine will be registered as from January 1969.

Nature Show:

The Club had six exhibits at the F.N.C.V. Nature Show, held from 26-28th August. These were:
"Embedding Insects in Plastic Resin" by Jenny Forse.
"Metamorphic Rocks" by Leigh Winsor.
"Live Reptiles and Amphibians" by Tim Anderson.
"Gem Cutting" by Gary Wallis and Frank Moore.
"Skulls" by John Bevan and Stephen Wilson.
"Preparation of Plant Section" by Carol Meyer.

The Club was grieved to hear of the death of Mrs. M. E. Freame, Secretary-Treasurer of the Club (1943-1958) on the 7th November, 1968.

Country Club Notes

The Peninsula Field Naturalists Club

(Extracts from the minutes of the Annual General Meeting held in the Frankston Teachers College on 24th July 1968.)

President's Annual Report

I am delighted to report that the Club has shown some signs of advancement during the year, but it is with considerable regret that I record the passing of one of our Vice-Presidents, Mr. A. Park, early in the year.

The speakers again covered a wide range of subjects as follows: Mr. Roy Wheeler—birds; Mr. Fred Rogers—acacias; Mr. John Goode—"Tortoises"; Mr. Le Soeuf—"Butterflies"; Mr. Alan Spillane—"Aborigines of Victoria"; Mr. and Mrs. Salter—"Birds and blossoms"; Mr. Bruce Woodfield—"The work of the Keith Turnbull Research Station"; Mr. A. M. Cobbett—"Vulcanism". In addition to these, Photoflora was presented at the Mornington Civic Centre in March.

Unfortunately the drought seriously affected some of the areas chosen for excursions resulting in cancellation of the scheduled trips. However, trips were made to Cape Schanck, Warneet, The Research Station in Ballarto Road, and Narre Warren North. Thirty-six members and friends enjoyed a week-end camp at Wilsons Promontory, several members jointed the Bird Observers Club in a Bay trip, and some members also took part in a working bee at the Heatherhill Road Sanctuary.

Membership rose by six, to forty. Attendances were also encouraging averaging 29 per meeting—3·5 per cent higher than last year. The attendance of only 90 at Photoflora was disappointing, but did not result in any financial loss.

The finances have fallen by approximately $20 to $73.17. The committee has decided to invest in a better type of projector, from which we will all benefit.

During the year a librarian was appointed. The usual naturalists publications are now available at every meeting. Some textbooks have been donated and further donations of this nature would be appreciated.

I now record my appreciation for the services of the many members who helped throughout the year, at the working bee, at Photoflora, the printing of the Syllabus, the excursion organizers, the librarian, the projector operator, the supper attendant, and last but not least, a very helpful and co-operative committee.

Signed: E. O. Dawson

The following officers were elected for the year 1968-69:

President—Mr. E. O. Dawson.
Vice-Presidents—Mr. A. Spillane, Mr. R. Marriott.
Committee—Mrs. L. M. James; Mr. A. G. House; Mrs. I. House; Mr. W. Ogden.
Publicity—Mrs. E. Gentry.
Librarian—Mr. B. Marriott.
Honorary Secretary—Mr. P. G. Bulfin.
Honorary Treasurer—Miss F. Hoshing.

Since the club was formed, 16 years ago, considerable changes have taken place, not the least of which is the fact that the Shire of Frankston has been reduced in size by the creation of the new and rapidly developing Shire of Hastings. It was felt that the name Frankston no longer indicated the true interests of the club and it was therefore decided that in future it would be known as The Peninsula Field Naturalists Club.

Flowers and Plants of Victoria in Colour

Secretaries, remember that this publication is available to your club members through you. Orders may be placed with the F.N.C.V. Treasurer.

Field Naturalists Club of Victoria

Secretary's Report

The Eighty-ninth Annual Report 1968

The accolades of the year must go to President Allen and Treasurer McInnes; neither of these gentlemen considered themselves talented enough but events have clearly demonstrated their ability.

Sixty-eight has been a quiet year with the new Treasurer concentrating on re-organizing the club's affairs to suit the new administration. The success of his efforts is due to his determination and the professional services of our book-keeper cum subscription secretary Mrs. L. Lewis.

Membership

With the pruning of the unfinancial members we now have 438 ordinary, 277 country, 33 junior and 138 subscribers as against last year's figures of 469 ordinary, 294 country, 32 juniors and 143 subscribers. This decline is partly due to the rise in membership fees.

There is certainly need for a determined membership drive this year.

The year saw the passing of old friends—former president Mr. W. L. Williams, and Mrs. J. J. Freame who did so much for the Hawthorn Junior F.N.C.

Honorary Membership was granted to Mr. A. J. Swaby, Mr. J. H. Willis, and Mrs. M. A. Ball.

Organization

My comment of the '67 report stands: we still find it difficult to get volunteers.

Our Articles of Memorandum allow absent council members to use proxies. We consider this could be useful training for future council members and would be glad to hear from interested people willing to act in this capacity.

It is not generally appreciated that over the past few years the vice-president has been taken on sufferance by people unwilling to let the club down. This office should be a stepping stone for the Presidency.

Nature Show

The unfortunate counter attraction provided by the new Cultural Centre reduced our 1968 attendance from 7,300 in 1967 to 4,953 in 1968.

The lyrebird theme was the centre piece designed as a typical fern gully complete with birds and bird calls while controlled lighting provided the effect of a 24 hour cycle. The Hawthorn Juniors captivated an audience with their demonstrations of gem stones and insects in plastic, while the S.G.A.P. display of flowers and shrubs from all states was superb as always.

Conservation and Wildlife Protection

The year has been a busy one with several new areas of interest coming into the picture. Wychitella was brought to our attention by local people agitating for its preservation as the last of the southern breeding grounds of the Mallee fowl. The tragic death of Mr. Holt has highlighted the need for a National Park or similar reservation on the Peninsula. Interest is now being revived by local naturalists since a survey has discovered a considerable number of Koalas in the Mt. Eliza district.

The most urgent requirement is still a large National Park in the Central Alpine area and recent acquisitions of crown land and river frontages present some concern as to whether we will be too late if we delay much longer.

It was very heartening to see the announcement of a National Park for the Little Desert but disappointing to realize that the size was provisional on the boundaries being defined.

The much debated sewerage project of the Board of Works may still not be the most serious threat to our Baysides. The polluting of Westernport Bay with oil through a leakage from a ship to shore fuel installation followed by the gas blow out on the Marlin rig may be a prelude to more serious ones such as the Californian disaster with 50 miles of coast line biologically destroyed by oil and detergent (ref. Time Magazine, February 14th and 21st issues).

For the coming year our immediate attention is concentrated on the possible reintroduction of the Wombat Bonus after 22nd May.

Cosstick Reserve

This present wildflower reserve of goldfield flora was left to the F.N.C.V. several years ago. During 1968, the C.R.B. acquired one acre for road widening purposes. The compensation thus received has been used to help with the renewal of the fencing.

Medallion

The Natural History Medallion for 1967 was awarded to Mr. G. Whitley, well known as an author, the Curator of Fish, and Historian of the Australian National Museum, Sydney. The Award was presented by Mr. A. Dunbavin Butcher at the May General Meeting.

New Groups

The year also saw the formation and discovery of new groups. Early in the year we were present at the inauguration at Porepunkah, of the Upper North-east F.N.C., which is now affiliated with us.

Mr. Ros Garnet discovered an independent Junior Club—the Pascoe Vale F.N.C., which we hope to encourage.

The Frankston F.N.C. is now known as the Peninsula F.N.C. (See report p. 82.)

In the embryo stage is the formation of a club at Wodonga; and the Victorian Naturalists Union which is an endeavour to co-ordinate clubs into regional groups to facilitate research and conservation.

Publications

The launching of the book *Plants and Flowers of Victoria* was an exciting one. Congratulations go to Mr. J. Baines for suggesting the idea; to Messrs. Cochrane, Willis, Rotherham, and Fuhrer, for the editing and photography; and to A. W. Reed of New Zealand for publishing the book with the club's assistance.

1968 Natural History Medallion Award

It has been learned, during preparation of this issue of the *Victorian Naturalist*, that Norman B. Tindale, D.Sc. has been awarded this Medallion.

Dr. Tindale was Curator of Anthropology at the South Australian Museum from 1928-1965.

FIELD NATURALISTS' CLUB OF VICTORIA

BALANCE SHEET AT 31st DECEMBER, 1968

Liabilities

Year 1967			
$451	Subscriptions paid in advance		$401
288	Sundry Creditors		133
343	M.A. Ingram Trust grant in hand		58
	Special Funds and Accounts—		
3,169	Building Fund	$3,104	
4,100	Publications Fund	4,298	
100	Library Fund	100	
521	Club Improvement Account	538	
200	Excursion Account	200	
5,217	Estate Marion Wright Legacy	5,217	
418	Estate Ruby A. Lewis Legacy	418	
200	Estate Miss I. F. Knox Legacy	200	
1,033	Microscope Project Account	1,048	
—	Flower Book Account	1,164	
			16,287
5,183	Surplus of Assets over Liabilities		6,547
$21,223			$23,426

We report that in our opinion the accompanying Balance Sheet and accounts of the Field Naturalists Club of Victoria are properly drawn up in accordance with the provisions of the Companies Act 1961 and so as to give a true and fair view of the state of the Club's affairs at 31st December, 1968 and of its operations for the year ended on that date, and that the accounting and other records examined by us have been properly kept in accordance with the provisions of the Act.

Melbourne
10th February, 1969

Signed:
Danby Bland & Co.
Chartered Accountants
Auditors

Assets

Year 1967			
$3,388	Cash at Bank	$3,378	
346	Sundry Debtors	1,396	
63	Badges and car stickers on hand at cost	47	
42	Microscope Project Stock at cost	136	
557	Books on hand for sale at cost	538	
—	Flower Book stock at cost	517	
			$6,012
4,218	Library Furniture and Equipment at cost		4,572
	Investment of Funds—		
	Publications Fund—		
1,200	Commonwealth Bonds at Cost	2,200	
	Stocks valued at cost—		
272	Victorian Ferns	231	
901	Victorian Toadstools	834	
708	Wyperfeld National Park	603	
61	Sundry Debtors	53	
958	Cash at Bank	377	
			4,298
	Building Fund—		
2,100	Commonwealth Bonds at Cost	2,100	
1,000	State Electricity Commission Stock at Par	1,000	
69	Cash at Bank	4	
			3,104
	Library Fund—		
100	Commonwealth Bonds at Cost		100
	Legacy Estate Marion Wright—		
5,200	Commonwealth Bonds at Cost		5,200
40	Cosstick Reserve—Maryborough —at cost		140
$21,223			$23,426

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st DECEMBER, 1968

Receipts

Year 1967			
	Subscriptions Received—		
$36	Arrears	$69	
4,286	Current	5,760	
156	Supporting	96	
			$5,925
288	Sales of Victorian Naturalist		370
194	Advertisements in Victorian Naturalist		279
	Interest Received—		
5	Library Fund	5	
126	Bank Account	167	
221	Investment on M. Wright Legacy	221	
			393
12	Surplus from Excursions		—
64	Sundry Income		135
239	Amount transferred from Building Fund A/c. for payment of Rent		227
$5,627			$7,329

Payments

Year 1967				
	Victorian Naturalist—			
$4,275	Printing		$4,018	
1,359	Illustrating		1,040	
410	Despatching		368	
67	Editorial		45	
			5,471	
(1,514)	Less Ingram Trust Grants		743	
				$4,728
	Working Expenses—			
34	Postage and Telephone		170	
40	Printing and Stationery		94	
40	Rent of Room for Storage		40	
45	General Expenses		95	
54	Affiliation Fees, Subscriptions and Donations		14	
15	Preston Junior Naturalists Club Rent		18	
24	Natural History Medallion Expenses		42	
1,180	Typing and Clerical Assistance and (Audit $50)		800	
(922)	Less transfer from Reserved Income		—	
152	Mammal Survey Group Expenses	$337	—	
	Less Ingram Trust Grant	337	—	
				1,273
240	Rent of Hall and Library			227
34	Insurance			57
246	Surplus for the year			1,044
$5,627				$7,329

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31st December, 1967	$3,169
Interest on Investments and from Bank Account	162
	3,331
Less Amount transferred to General Account for payment of rent	227
Amount of Fund at 31st December, 1968	$3,104

PUBLICATIONS FUND

Amount of Fund at 31st December, 1967		$4,100
Surplus for the year from—		
Ferns of Victoria and Tasmania	$21	
Victorian Toadstools and Mushrooms	24	
Vegetation of Wyperfeld National Park	71	
		116
Interest on Special Bonds and Bank Account		82
Amount of Fund at 31st December, 1968		$4,298

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 31st December, 1967	$521
Nature Show Profit	237
Profit on Booksales	134
	892
Less Books Purchased for Library and cost of binding books	354
Amount of Account at 31st December, 1968	$538

General Meeting

10th February, 1969

Approximately 150 members and guests were present and Mr. E. R. Allan presided. Mr. Allan announced that it was Mr. Woollard's birthday and extended good wishes on behalf of the club.

Moved by J. Woollard, seconded by A. Fairhall that the minutes of the General Meeting held on 30th January, 1969 be adopted and taken as read.

Moved by A. Swaby, seconded by E. Hanks that the proposed new members listed in the *Victorian Naturalist* for February be accepted.

A letter was received from Mr. and Mrs. J. D. Watson expressing their appreciation of two articles, "F.N.C.V. Excursion to Broken Hill" by E. B. King and "Whipstick Nature-Trail" by F. Robbins published in the June and August issues of the *Victorian Naturalist* this past year. They congratulated the authors and recommended the articles as guides for these areas.

Mr. A. Dunbavin Butcher of the Fisheries and Wildlife Department wrote conveying thanks for a donation of $105.00 to the Rylah Research Institute. Two Gould prints, one of the Fruit Bat and another of the Tasmanian Potaroo

have been purchased and will be hung with appropriate plaques attached.

Mr. D. Behring of Upwey has made an offer of the copies for the past ten years of the *Victorian Naturalist* to any interested persons.

A letter was received from Mr. R. J. Lawson, Honorary Secretary, Peninsula Field Naturalists Club on the dearth of conservation projects in the Mornington area and the need for the establishment of parks and sanctuaries in the Mt. Eliza and adjacent areas.

A letter was received from Lt. Col. Dettman, Honorary Secretary, Royal Horticultural Society, advising that space will be provided for societies interested in conservation, natural history, historical, etc., at the National Cultural Centre when proposed plans are completed. It is expected that accommodation for meetings and shows, office and secretarial services be provided and this letter was passed to Council.

Announcements

An enquiry was made regarding the possibility of forming a Junior Field Naturalists Club in the Montmorency area and if there was available some person who could advise or organize this club.

Mr. V. Serventy forwarded a request for a list of conservation societies for publication in "Wildlife" Magazine.

Dr. E. M. H. Ealey of Monash University addressed the meeting on "Echidnee" and also discussed many subjects allied with conservation. He began by remarking on the rate of clearing of forest areas for agricultural and forestry purposes in the Western Districts, notably around Naracoorte and Bordertown. The almost complete devastation of these areas has led to the eradication of the habitat of much native flora and fauna. Because of the rate of growth of world population, estimated to reach 7000 millions by 2000 A.D., such progress is inevitable and associated problems such as pollution become apparent.

Dr. Ealey referred to naturalists and associated clubs as watchdogs of the community and as such should be active as conservation supporters and join with other clubs, not necessarily in complete agreement with their aims, but where mutual interests are compatible. One example of this would be the multi use of areas such as shooting preserves and national parks in one.

He suggested that there was a need for preserving those things that have no monetary value also, and that landholders should be encouraged to leave areas of bush in gullies and on uneconomic land as a habitat for small marsupials and birds. It was his belief that the red kangaroo would not become extinct because of its value, and that farmers could run kangaroos as an added income in conjunction with sheep.

Dr. Ealey stated that research was now being carried out by the Forestry Commission on controlled burning with the idea of preserving the habitat of animals and birds. Controlled burning did not totally destroy all forest litter or burn out the overhead canopy and regeneration was quicker.

An experiment carried out at Daylesford showed little change in the numbers of wildlife and it was believed that forests could support such birds as quail and many other wildlife with certain manipulation.

The question of the frequency of burning has not been finalized because all the results were not known and evaluated.

The wombat bonus was due to be reimposed on 22nd May, 1969 if legislation is not passed. Dr. Ealey was of the opinion that it should not be reimposed and a concerted attempt to sway public opinion be made to prevent this. His suggestion was that after elimination of the bonus, the animal should be removed from the vermin list and control exercised by the Lands Department, thus ensuring only those animals causing trouble are destroyed.

Dr. Ealey concluded his talk with the showing of an excellent and informative film made at the Zoology Department of Monash University. This film showed much of the research being carried out at the Jock Marshall Reserve, including the breeding of Cape Barron Geese, the Brush Turkey, Parma Wallaby and the investigation into the habits of the echidna. The echidna project was of particular interest because of an ingenious method used to locate animals which had burrowed underground, by attaching a small transmitter to their quills so they could be tracked by radio.

The audience was most appreciative of the talk and questions and discussion followed on a number of points raised by Dr. Ealey.

The President expressed the club's thanks to Dr. Ealey for his visit and a very thought provoking address.

Nature Notes and Exhibits

Mr. D. Lee demonstrated a simple, home-made microscope which was very effective and could be easily used by children. He also exhibited a toad.

Mr. D. McInnes showed the blood worm (Chiromonas) and a midge under a stereoscopic microscope.

Mr. K. Trotter showed specimens of the Red-tailed maggots, the vegetable caterpillar (Cordyceps) and a collection of fossil shells mounted in plasticine, found at Princetown near Port Campbell.

Miss K. Hall exhibited two fruits of the Kapok Tree (Cochlospermum) from North Queensland and a specimen of the cottony cushion scale.

Mrs. North showed a piece of petrified wood obtained from Oakey, Queensland.

Mrs. Bennett displayed several branches of the common hemp-bush, (*Plagianthus pulchellus*).

Mr. T. Sault showed an interesting tray of entomology specimens, including beetles, moths and the nest of the sawfly larvae.

Botany Group Meeting

12th December, 1968

Twenty-four members and friends were present and Mr. Fairhall was in the Chair. The meeting took the form of a Members' night. Mr. A. Morrison showed some very beautiful slides, including an exceptionally large bush of Victorian Waratah, also a big patch of *Diuris punctata*, and slides of *Dendrobium speciosum* and *Dendrobium striolatum*, with close-ups of the individual flowers.

Mr. J. Willis spoke of the Mountain Plum Pine (*Podocarpus lawrencei*) which was first discovered in Tasmania and described by J. D. Hooker as a small straggling bush, sometimes rising to a tree 13 feet high. Mr. Willis then described a very large specimen he had found within ¼ mile of the summit of Goonmirk Range which was 30-40 feet high, with a trunk 2 feet 4 inches diameter at 3 feet above the ground. As this is a very slow-growing plant he thought this particular tree must be more than 1000 years old. Mr. Willis also showed two slides, one of a plant endemic to Mount Sonda, Central Australia, thought to be a prostanthera, but now since coming into flower it has been identified as Wrixodia. The second slide was of the only heath in the Northern Territory, Leucopogon (unnamed).

Miss Galbraith spoke of mistletoes which do not grow on trees, with special reference to *Nuytsia floribunda* (Western Australia Christmas Bush), of which she had a fine specimen brought in by Mr. Morrison. She also mentioned Gold-leaf-ed Mistletoe (*Atkinsonia ligustrina*) which does not grow on a tree but is parasitic on other mistletoe.

Miss Lester then organized a very entertaining botanical quiz with eight questions relating to the various talks the group had had at meetings throughout the year. This quiz caused much wracking of brains and considerable amusement.

Mr. Fairhall thanked all who had contributed to the evening and members expressed their appreciation.

Supper was then enjoyed by all present.

Geology Group Meeting Report

5th February

Twenty-three members and visitors attended with Mr. Davidson in the Chair, with the subject for the evening being Holiday Reminiscences. Mr. Wigmore showed slides of Geological features taken on a tour covering Vic., S.A., and N.S.W. These included slides of the Tower Hill caldera, showing the low tuff-ring on the seaward side and a high one on the N.E. side which indicate a S.W. prevailing wind at the time of the eruption. Also slides of the lava caves near Mt. Eccles caused by molten lava flowing out from beneath a solidified crust. Another of an old open cut copper mine at Burra S.A. which operated in 1870 and slides of unusual rock formations at Mootwingee. Miss Bennett showed slides of lava flows from Mt. Napier. This slide clearly showed the tongue of lava which filled a valley cut in Tertiary sediments. Other slides included views of Mt. Eccles and Lake Surprise, Byaduk Caves, and two interesting slides of scoria quarries at Mt. Eccles and Mt. Rouse. These showed thin vertical seams which were concentrations left by the more volatile gases in fumeroles, which are the end product of Volcanic action. Several other members spoke of their activities during the holiday season.

Exhibits

Only the most interesting of a very large collection are described.

Mr. Davidson—Dendritic Chalcedony, Bulong, W.A. Pink Beryl, Lepidolite, Zinnwaldite, Eucryptite, Columbite,

(Londenderry), W.A. Spodumene, Pink and Green Tourmaline, Ravensthorpe, W.A. Pentlandite, Kamalda, W.A.

Miss Bennett—Volcanic Bombs; Mt. Eccles and Mt. Rouse.

Mr. Wigmore—Malachite and Azurite; Burra, S.A. Azurite; Cobar, N.S.W. Galena and Pyrite; Cobar, N.S.W.

Mr. Dodds—Kancar, (limestone concretion); Island in St. Vincents Gulf, S.A.

Mr. Sault—Fossil Leaves, (Tertiary); Narracan, Vic.

Notice for Geology Group Meeting

2nd April

Dr. D. Spencer-Jones (Mines Dept.).

Subject—"The Grampians Range of Western Victoria".

Marine Biology & Entomology Group

3rd February 1969

The meeting was chaired by Mr. Condron, 18 members being present.

Following a discussion which took place at the previous meeting regarding an excursion to Kilcunda, the Excursion Secretary, Miss M. Allender was contacted, the result being that a Club outing to Kilcunda is to take place on 16th February, low water being at 4 p.m. approximately.

Some discussion took place about the staining and rendering transparent of natural history specimens as carried out by Miss Jenny Forse; as it was suggested that she write an article for the *Victorian Naturalist* setting forth the details of this procedure.

As Mr. Strong retires in April, it will be no longer possible to hold our Group Meetings at Parliament House from that month on. Some discussion took place as to an alternative venue. The Secretary is to contact the Herbarium, and also Dr. Brian Smith, Curator of Invertebrates, National Museum, with a view to ascertaining whether it would be possible to meet at either of these places. Miss White kindly offered to lend her home, but it was felt that a more central location would be more convenient for most members. The last meeting to take place in Mr. Strong's rooms at Parliament House will be on 3rd March. As the first Monday in April is Easter Monday, it was decided that there would be no meeting for this month.

EXHIBITS

Mr. McInnes gave a short talk on a pond-collecting excursion to the Botanical Gardens, and the Albert Park Lake which he had led for the Hawthorn Juniors on Saturday, 1st February. He described the condition of the Albert Park Lake which was in a fairly satisfactory state for collecting. He said that some Paraponyx larvae were collected, although these were not as numerous as in previous years. A species of rotifer Asplanchna, which Mr. McInnes said that he had not seen for years, was also collected, specimens of which Mr. McInnes showed under his microscope, together with several other species of microscopic pond-life. Mr. McInnes remarked on the absence of Daphnea, usually abundant at this time of the year.

Mr. Strong showed six limpets of the Acmaeidae family: *Notoacmea scabrillrata*, "The scaly-lined Limpet". These were all collected at Tulum, Westernport Bay, within a few yards of one another, and were displayed to show the great colour variation in this species.

A species of hydrozoa collected by Mrs. J. Watson in Westernport Bay from a depth of approximately 30 feet. This specimen was stained with Haematoxylin, and shown under low microscopic power.

A species of eccada taken on the F.N.C.V. outing to Tooronga Falls, and the larva of a beetle, *Ipsaphes bicolour*, taken from under bark in the same area. This was shown under a stereoscopic microscope.

Miss Jenny Forse showed butterflies in plastic. Miss Forse explained how these were made, and how the bulb portion of an electric light globe was used as a mould.

Mr. Condron showed species of *Ogyris genoveva*. This butterfly is a member of the Lycaenidae family and was taken by Mr. Condron at Tallarook, Victoria. Mr. Condron said that this was one of the few localities in Victoria where it was found. He also showed various species of beetles from Rosebud, Vic., and four different species of cicadas.

Mrs. Lee showed a beetle which she had collected at Mallacoota, which Mr. P. Kelly identified as *Eupoecilia australasiae*. The Fiddler Beetle, a species of the Scarab family. Mrs. Lee also showed, some colour transparencies she had taken of various insects. These were much enjoyed by members.

Mrs. Pinches, who had been on a trip to New Guinea, showed a series of colour transparencies of aspects of life in that country. These proved of great interest to members.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Wednesday, 12 March—Annual Meeting at National Herbarium, The Domain, South Yarra; Commencing at 8 p.m.

1. Minutes, Reports, Amendments.
2. Correspondence.
3. Subject for the evening—"Presidential Address", Mr. E. Allen.
4. New Members
   (a) *Ordinary:*
   Mr. Keith Angus, c-o. 104 Ford Street, Ivanhoe 3079. (Interest: Geology.)
   Mr. Geoffrey Butt, 16 View Road, Vermont 3133.
   Miss Mary K. Doery, 20 Tower Street, Mont Albert 3127. (Interest: Zoology and Botany.)
   Mr. Phillip S. O'Connor, Flat 6, 38 Redan Road, East Caulfield 3145. (Interest: Mammals.)
   Mr. Brian V. Timms, Zoology Department, Monash University, Clayton 3168. (Interest: Wildflowers and Marsupials.)
   Mrs. Ethel M. Samuel, 9 Edna Street, Heathmont 3135.
   (b) *Country:*
   Mrs. Margaret J. Carmody, Nariel, Cudgewa, Victoria 3705.
   Mr. C. H. Fleming, Governors Drive, Mt. Macedon, Victoria. (Interest: Microscopy.)
5. General Business.
6. Nature Notes and Exhibits.

Monday, 14 April—Lecture: "Melbourne to Broome via Adelaide", J. Ros Garnet.

GROUP MEETINGS

8 p.m. at National Herbarium unless otherwise stated.

Thursday, 13 March—Botany Group.
Wednesday, 19 March—Microscopical Group.
Friday, 28 March—Junior Meeting in Hawthorn Town Hall at 8 p.m.
Wednesday, 2 April—Geology Group. "The Grampians Range of Western Victoria" —Dr. D. Spencer-Jones.
Thursday, 3 April—Mammal Survey Group Meeting in Library of Fisheries and Wildlife Department, Flinders Street Extension at 7.45 p.m.
Friday, 4 April—Good Friday, No Meeting of Preston Juniors.
Monday, 7 April—Entomology and Marine Biology. No meeting.

F.N.C.V. EXCURSIONS

Sunday, 16 March—Daylesford. This excursion will be led by officers of the Forestry Commission and members will be shown the results of controlled burning. The coach will leave Batman Avenue at 9.30 a.m., fare $2.00. Bring two meals.

Friday, Saturday and Sunday, 25, 26, 27 April—Leongatha and Walkerville. Accommodation has been booked at the Leongatha Motel for Friday and Saturday nights and a visit to Walkerville is on the programme. The motel will cost $5.50 bed and breakfast, dinner is available and members should arrange picnic lunches for the weekend. Coach fare will be $7.00 and should be paid to the excursion secretary when booking.

29 August-21 September 1969—It is hoped to have an excursion to Western Australia at this time if sufficient members are interested. The party would leave by train Friday evening and arrive in Perth on Monday morning. A coach would be chartered and the party would travel to the Geraldton area for a few days, then south to Albany across to Busselton and back to Perth to catch the return train on Thursday arriving back in Melbourne on Sunday 21 September, 1969. Accommodation would be on a Dinner, bed and breakfast basis and members would be responsible for their own lunches. The cost would depend upon the number going but should not exceed $260.00 for train, coach and accommodation. As this trip will be dependent upon enough members wanting to go, those interested should notify the excursion secretary as soon as possible.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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F.N.C.V.

Vol. 86, No. 4 12 April, 1969

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Front Cover:

This head study of the Gum Emperor Moth, shortly after emergence from the cocoon, was photographed by Graham Pizzey. Note the feelers, indicating a male moth.

Wildflower Study Tour in Western Australia. September 1968

by Elizabeth K. Turner

At the beginning of September, 1968, the writer was privileged to be one of a party of thirty assorted persons to join a Wildflower Study Tour of six days, arranged by the W.A. Government, travelling by bus North from Perth. My tour across the Nullarbor and through the south-west areas of W.A. with the F.N.C.V. in August and September, 1963, had whetted my appetite to see more of the glories of the Western wildflowers before cultivation and so-called progress had completely eliminated part of their habitat.

The tours are provided with a bus driver, a hostess and a botanist; this latter post being filled by Mr. Bill Tothill, a keen naturalist who had traversed the route so often that he had a remarkable knowledge of where to find unusual specimens, and where to see the varieties of plants in abundance. As accommodation, meals and cups of tea were all provided, the most strenuous exercise one had to do was getting in and out of the bus, and investigating the environment while the bus waited.

North-East to the Darling Escarpment

Our first morning-tea-stop was on the Darling Escarpment, north-east of Bullsbrook and overlooking the Chittering Valley. The eucalypt woodland was ablaze with the red and green of Mangles Kangaroo-Paw (*Anigozanthos manglesii*) and with patches of blue *Leschenaultia biloba* which varied in colour from pale sky blue to deep saxe.

In the scrub amongst the weird blackboys, (*Xanthorrhoea preisii*) there were mats of blue-violet *Dampiera* and the delicate blue Morning Iris (*Orthrosanthus laxus*), the ubiquitous yellow Native Buttercup (*Hibbertia hypericoides*) and bright yellow tufts of *Dryandra polycephala* on leggy wands. This area rather resembled the Kings' Park flora, in that there was an abundance of purple *Sowerbaea multiflora, Conostephium pendulum, Synaphaea polymorphia* which occurred in most areas on our tour, and that lesser relative of the Kangaroo-Paws', the yellow cone flower (*Conostylis*). *Eriostemon spicatus* with lilac flowers was common, and there were startling clumps of the deepest violet *Calytrix brachyphylla*, and a relative of the Daphne family, sweet-scented *Pimelea suaveolens* with large, yellowish-green bracts; also lots of the weird waving russet-coloured *Stirlingia*.

Among the smaller flowers of this forest, the most eye-catching were the stands of Cowslip Orchid (*Caladenia flava*), *Droseras macrantha* and *D. menziesii* climbing to 3 or 4 feet on the undergrowth, also the flat-faced *Stylidium reduplicatum* with tremendous triple-plate-like flowers in creamy-white, which was hailed by all the uninitiated as an orchid at first sight.

I found also one of my favourites, the little heath-like *Andersonia* with pink calyx and blue corolla, which is a delight when viewed under the lens. There was such an abundance to see that some of us forgot about the tea boiling on a sort of gas-primus stove at the back of the bus!

Through the Eucalypt Woodlands

We then had wayside stops to admire large stands of golden-yellow *Lambertia multiflora* or *Grevillea pilulifera* which from a distance looked like a fluffy white Hakea. A little further north, we stopped to admire patches of the red pea-flowered crinkle-leafed poisonous *Gastrolobum villosum, Hovea* sp. with enormous violet flowers, pink *Boronia inornata* and *Hybanthus calycinus*, one of W.A.'s violets.

At the next roadside stop was a rare sight which has made me personally more appreciative of the Hibbertia family—these were beautiful shrubs of *Hibbertia miniata* about 2 ft. high, covered with large orange cup-like flowers about 1½ inches in diameter, with central crimson or saffron coloured stamens; here also we saw the quite rare white, daisy-like bushes of *Asterolasia pallida.*

Along the roadside were clumps of blue and snow-white fan-flowers *Scaevola* sp. and numerous bushes of *Calothamnus sanguinius* with its red pronated paws, and masses of the blue false blind grass, *Stypandra imbricata.* In one area, Bill Tothill collected *Dryandra nobilis* with tall gold balls up to 3 or 4 inches in diameter. We then made an interesting detour through the grounds of Keaney College, now an Agricultural College, but until the recent English law preventing the migration of orphan boys, this was the so-called "Boy's Town" of the Roman Catholic Church. On the hillside here, were Cycad palms, over which *Clematis aristata* was heaped in snowy-white profusion.

Our next roadside stop was to admire the tawny cats' paws (*Anigozanthos humilis*) and the smaller 12 inch red and green *Anigozanthos bicolor.* We had a cold chicken and salad lunch near a gravel pit in the woodlands and then drove on to visit the native mission at New Norcia, built by Dom Salvadore in 1866 and still maintained by Spanish Monks, who long for their homeland.

Further north, we came upon the first of the Feather flowers, the pink *Verticordia picta* and the golden *Verticordia grandiflora*, and later, the beautiful scarlet *Verticordia grandis.* In this area we saw our first furry white lamb's tails (*Lachnostachys verbascifolia*).

Into the Irwin River District

Our overnight accommodation was in a small, green and white railway train on a siding at Watheroo, and for our evening entertainment Bill Tothill showed slides of his own photographs of the best of the wildflowers from numerous tours. The worst inconvenience at this stop was when the lights on the carriages failed and we had to go to bed by torch light, but as the bunks were comfortable and warm it mattered little!

An early morning cup of tea was available in the railway yard and we left soon after breakfast for points north through Coorow and Three Springs. This area carries mainly York gum or Jam and extensive sand plains; the conditions are warmer than in the districts to the South-West, and the vegetation is earlier. Cultivation is so extensive along both sides of the highway that the wildflowers make their chief display along railway cuttings and roadsides. In sandy country we saw our first stands of woody pear (*Xylomelum angustifolium*) and the tall, beautiful orange *Banksia prionites* with heads like hypertrophied acorns. Close by was a bush of crimson *Hakea bucculenta*, easily 10 feet high; also we found specimens of an engaging dark-purplish leaf-eating caterpillar with a hooked tail, which, when disturbed, reared up and backwards in extreme opisthotonous and stuck

Hakea bucculenta *Photo:* Author

his fearsome looking feet and bristles well out in front of him.

A crimson mat of bells of *Marianthus erubescens* covered some of the yellow flowering Acacias along the way; the commonest shrubs seemed to be the lilac-pink *Baeckea camphorosmae* and other species of Myrtaceae. A beautiful prostrate *Hemiandra gardneri* with scarlet flowers about one inch in diameter was found. We were delighted by the lovely copper-cups (*Pileanthus peduncularis*) and by an attractive rose-pink flower, looking like an over-sized Baeckea, called *Commersonia pulchella*, and belonging to the Sterculia family; along with the Keraudrenia of which we saw many purple-violet species, and with the Thomasia which had felty-hair and bright-coloured purplish-pink calyces.

There were startling patches of feathery smoke-bush (*Conospermum incurvum*), and I was much in demand as a photographic contrast medium in my scarlet blouse.

Hibiscus farragei was found covered with lilac-violet flowers; and the herb-like plant about 2 feet high with apricot, green and brown bract-covered heads turned out to be *Geleznowia calycina*, a member of the Rutaceae family that I had not met before. There were bushes of large pink *Isopogon baxteri* which would have added colour to any suburban garden. Here, yellow and white cone flowers made perfect wreaths with the flowering edges raised 3-4 inches above the sand. The bright waving spikes of the gold *Grevillea eriostachya* all pointed in the same direction, and the weird dull-crimson unopened cones of the *Grevillea leucopteris* topped with satiny-white flower spikes, projected for 3-5 feet above their thick dark-green foliage, and gave the impression of being one plant shooting up through another.

We travelled most of the day through Mallee and mixed Wattle-Scrub through which the winding Irwin River appeared to have to cut a series of terraces; yellow pennants (*Loudonia aurea*) added colour to the roadsides. We stopped to photograph a hillside of pale-pink *Schoenia cassiniana* and an enormous tree of red flowering *Hakea multilineata*, and later to afford similar treatment to the *Eucalyptus rudis*, the famous Greenough trees near the coastal sand dunes; these thick-trunked eucalypts "leaning on their elbows" as Bill said, sloped almost horizontally in a direction away from the sea.

Three Nights at Geraldton

That night and the following two, were spent in luxury in a motel at Geraldton, overlooking vast sand dunes and the Indian Ocean which beckoned so strongly that we walked over for a swim. The next day was

spent exploring Geraldton and environs, and being entertained in the evening with films of the underwater discoveries of the wrecks of Dutch galleons off the W.A. coast.

North to the Murchison River and Heath Scrub Country

The following day we continued northward through country covered with York Gum (*Eucalyptus loxophleba*), Wattles, Sheoke (*Casuarina cristata*) and spiky Hakeas, through Northampton to the Murchison River and on to the coastal heath scrub. Here we found another red and yellow-green member of the Leschenaultia species, *Leschenaultia linarioides*, and the orange and red one-sided bottle brush (*Beaufortia squarrosa*) and I was surprised to find the blue climbing Cheiranthera species.

We passed the original stone hut built for Drummond, the naturalist, and although now roofless, the wooden slats and floor boards cut more than 100 years ago, are in excellent condition. We had lunch at the Murchison River and found bushes of Cassia and of pink and blue Eremophila; I always feel like giving a private cheer for the Eremophila—they bloom so bravely and handsomely in tough places. Near the river, a peculiar cactus-like, almost prostrate shrub was found which had scarlet, sickle-shaped pea flowers, fully 2 inches high; this was probably *Brachysema aphyllum*. Also there were abundant patches of lemon-yellow and white *Cephalipterum drummondii* and Helipterum species, and some *Calandrinia linifolia*, a succulent member of the Portulaca family, with magenta flowers, called Parakeelya in Central Australia. There were also sweet smelling pinkish mulla mullas, (Trichinium and Ptilotis) and we found our old Victorian friends the blue buttons (*Brunonia australis*) in flower. At one roadside stop there were dozens of bushes of pale pink *Grevillea petrophylloides*, and some rocky outcrops covered with gold and pink Feather-flowers.

East to Mullewa and Back to Watheroo

Next day, 6th September, we left Geraldton and travelled E.N.E. mostly over undulating farmlands to Mullewa, between carpets of pink and white Schoenia, yellow and white Cephalipterum and bushes of purple Keraudrenia interspersed with blue Dampiera, with the yellow of the wattles forming a higher layer of vegetation. The only hills were the small, distant Koolonooka hills with

Beaufortia squarrosa

Photo: Author

obvious red scars made by the Western Mining Corporation, extracting iron ore.

At our first stop I noted the blue Halgania species and bushes of rose-pink *Isopogon adenanthoides*; later a shocking-pink *Calythrix muricata* and masses of golden Podolepis. All day we passed bushes of beautiful *Hakea bucculenta* with creamy-crimson tinted spikes, and we saw the enormous orange heads of the *Banksia ashbyi*. At one stop there were clumps of powder-blue *Dampiera wellsiana* looking rather like the garden Love-in-the-Mist. There was a bright red showy *Grevillea dielsiana* and a pure white one *G. candicans*.

At Mullewa, the Country Women's Association provided lunch in the Town Hall Annexe, and later we visited a private zoo where the animals and birds were well fed, but their enclosures were inadequate and denuded of vegetation. We preferred to see the flocks of galahs, corellas and black cockatoos in the wild, with the frequent green flashes of the "28 parrots" on the wing.

At Morowa we stopped to photograph the profusion of "everlastings" along the railway siding; there were pink Schoenias and yellow and white Cephalipterum and some Ptilotis with soft pink inflorescences. Later, we passed numerous bushes of a pale pink Thryptomene, softer and wispier than our Grampians variety. Hidden away in the scrub we found the copper-coloured native pomegranate (*Balaustrion microphyllum*) and some fine bushes of native foxglove (*Pityrodia axillaris*).

Probably the most fantastic sights of all were the wreaths of *Leschenaultia macrantha*, perfect circles from 8 to 24 inches in diameter, edged with flowers in red and yellow, these covered a gravelly area and looked as though the place had been garlanded for a festival, so neatly were they laid about. Here also was a weird furry, pale *Anthotroche blackii* with purple-black velvety stars; to my surprise this belonged to the family Solonaceae.

There was a most beautiful *Melaleuca steedmanii* of intense scarlet, edged with golden anthers and some purple *Melaleuca conothamnoides*.

At the afternoon tea stop we inspected the inside of a termites' hill and finally sped southwards in the darkness to our railway-carriage bunks at Watheroo, singing as we went.

Golden *Lambertia grandiflora*

Photo: Author

South via the Coastal Plains through Badgingarra

On our 6th and final day we traversed wild heath scrub country near the coast, where the bush is quite virgin and covered with Banksias, Nuytsias and xerophytic greyish vegetation enlightened by carrot-orange bottlebrush tufts of *Eremaea beaufortioides*, yellow Verticordia, violet Calytrix, white furry Astrolomas and Isopogons in yellow and pink. There were also some dusty-pink Hakeas and a red Lambertia species.

In some areas there were stunted Eucalypts with large fruits like the bowl of a smoker's pipe; Bill called these "blackbutt". In a clearing we found many black Kangaroo-Paws, (*Macropidia fuliginosa*), these have much larger seeds than the other Kangaroo-Paws and are in a separate genus. One rather dusty bush of red-bugle (*Blancoa canescens*) was found.

We came to the edge of the Darling Escarpment at Dinner Hill, and here we saw a Hakea with tough thorn-edged leaves shaped like a shell. From this vantage point we looked over the plains to Badgingarra where later, the women of the Progress Association provided lunch for us in the hall; they also had on display and for sale, wildflowers from their area.

The bus travellers were keen to obtain the fruits of two Banksias because of their amusing shapes; one, *Banksia candolleana*, had fruits which resembled Donald Duck with his curly beak open, and the other species looked like a little bird sitting on its nest. I also found the ugly drum-stick heads of the *Dasypogon bromeliaefolius* covered with tiny cream flowers.

To Perth via the Jarrah Forests and Across the Moore River

Afternoon tea was near Regan's Ford across the Moore River and it was a pleasure to see trees and water again. Here there was blue Boronia and pink Thryptomene and clumps of tall Donkey Orchids (*Diuris emarginata*); I counted 54 stems in one group. There were also numerous bushes of a shrub looking vaguely like a green variety of *Boronia megastigma*, and known locally as "false boronia", however the flowers were of two sizes with six coloured sepals, the female flowers being larger than the male—I think a type of Euphorbia.

From here south through Gingin we passed through swampy country with many fine paper-bark Melaleucas and patches of *Anigozanthos manglesii* and *A. viridis*, the shades of green in the latter making it one of the most beautiful of the Kangaroo-Paws. In this area also we found a bush of *Burtonia scabra* about 4 feet high and just as wide and covered with purply-blue pea flowers.

Concluding thoughts

We returned to Perth on the evening of the 6th day, having covered a leisurely 950 miles with many delightful wayside stops. Each member of the party was presented with a small book of coloured photos of the wildflowers, with some pages for notes and autographs.

We saw and admired many hundreds of species of flowers and foliage, too numerous to mention in this article; most of the party refrained from picking any of the flowers, except for bunches of the profusely growing everlastings. Those of us who were keen conservationists were somewhat dismayed on one or two occasions only, by the enthusiastic picking of a few species, but on the whole we consider the tour well conducted, worthwhile, and reasonably priced.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Dotterel's Odd Nesting Site

These notes come from Mr. R. A. Young of Shean's Creek, Victoria.

It was brought to my attention by Bill Osborne, a student at the Benalla High School, that a Black-fronted Dotterel (*Charadrius melanops*) was nesting in a very unusual place. The nest was located about 1 foot from the bitumen in the gravel shoulder on the Lurg Road, 8 miles north-east of Benalla, Victoria.

The nest was simply a shallow depression in the gravel and contained two very well camouflaged eggs. The eggs were cream coloured with numerous brown and blue-grey markings, giving them an overall dark coloration which matched the colour of the gravel almost perfectly.

The nest was located at the intersection of the two co-ordinates in the lower picture.

Photo: Author

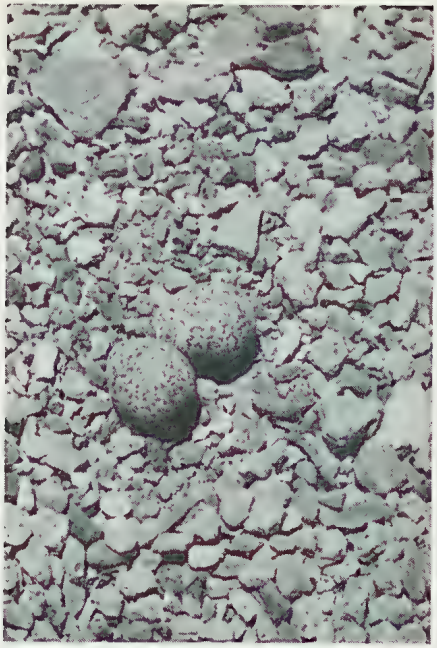
Black-fronted Dotterel on nest

Photo: Author

The Black-fronted Dotterel usually nests along watercourses. In this case, the nearest water was a very small paddock dam about 200 yards away. The area surrounding the dam was well trampled by livestock and generally unsuitable for nesting. The only suitable area for nesting was a small creek (Joyce's Creek) approximately half a mile away.

The dotterel did not move from the nest as vehicles passed within inches, but when approached on foot she would leave the nest and perform a broken wing act in order to lure the intruder away from the nest.

Upon returning to the nest two days later it was found that the eggs were gone. There were no signs of egg shell fragments or disturbances to the nest, indicating that the eggs were probably removed by a person.



Eggs of the Black-fronted Dotterel
Photo: Author

Two Bird Notes

Mrs. Ellen Lyndon of Leongatha supplied these two notes.

Yellow-faced Honeyeaters

When staying at the neat little camping park at Nowa Nowa in East Gippsland recently (9-10 November), we watched a pair of Yellow-faced Honeyeaters carefully working over the branches and leaves of *Acacia pruimosa,* the Frosty Wattle, under which we were parked. This is a late summer or autumn flowering wattle and it seemed unlikely that sufficient insects could be present to warrant such constant activity. Further observation showed that the birds visited each leaf in turn and applied their bills for an instant to the gland on the leaf stem. I could detect no taste of sweetness in the gland myself but apparently the honeyeaters found them worthwhile. *A. pycnantha* is not native to the district but has been planted as an ornamental tree. Worthy of note also were two fine specimens of *Eucalyptus crenulata,* the Zebra Gum, which finds that sheltered spot to its liking.

White Starling

A pure white starling has been reported on a number of occasions feeding among a flock of normally colored birds south of Leongatha along the Inverloch road.

The Silky Daisy

From Miss Jean Galbraith of Tyers in Victoria, come these interesting notes.

Reading the plant lists at the end of the pleasant account of the Beechworth Excursion (*Vict. Nat.,* Nov. 1968) I delighted in the mental pictures they brought to mind, and thought of the discoveries and adventures associated in one's memory with different plants. One that has a special place in my memory is Silky Daisy, *Celmisia sericophylla* (which somehow got its name a little mixed in printing). It grows, as the alternative name suggests, only in the Bogong area, and is larger, and, because of its broader ray florets, looks whiter than Silver Daisy, *C. longifolia.* In Big River and Watchback Creek (two of the three localities where it is known to be) it grows actually in water or within reach of spray; but at McKay Creek, where it is most abundant, it extends from the stream far up the hillside. The adventure I personally associated with it is the discovery that unlike *C. longifolia,* it dies down to the creeping rootstock after flowering. This could almost be deduced from the foliage of the two species. The leaves of *C. longifolia* are hard—quite tough enough to endure months under heavy snow; those of *C. sericophylla* are as soft as silk, broad and thin and silver grey, as limp in texture as those of the other species are firm.

When botanizing above Watchback Creek with a technical officer from Bogong Forestry Office in 1963, I suggested we visit a patch of *C. sericophylla* which I remembered.

We plunged through snowdrifts and wet undergrowth to the creek, visible only here and there between

snow-ridges. Swollen by melting snow it poured over rocks which at one point were quite covered by matted rhizomes of *C. sericophylla* as thick as one's finger. There was none of the silver grey 8 to 10 inch foliage I remembered from the flowering season in January. Many rhizomes were bare, but others, apparently uncovered a few days sooner, had sprouting leaves, rarely an inch long, in pale gold star-like tufts at the nodes.

Even the shining white flowers, which I first saw in late January when those of *C. longifolia* were fading, were not as memorable as those pale gold leaves which in a few days would be grey-green. This was on 19th Oct. Since the overwintering foliage of *C. longifolia* was full grown and ready for work it is not surprising that that species flowers before *C. sericophylla,* although the flowering of the two species overlaps.

Illustrated Lecture

Mr. Claude Austin will lecture on "Odd Pictures of Odd Places in Australia", at the National Herbarium on Friday 30 May. F.N.C.V. members and friends are invited to attend by the Native Fauna Conservation Society.

Book Review

Australian Rocks and Minerals

By John Child

Periwinkle Press: 1968. Price $1.25

This book gives an elementary introduction to the main aspects of geology, including earth structure, rocks, minerals and fossils.

While it is good to see an introductory book using Australian examples, this one has too many wrong and misleading statements to be recommended. In the preface the author states "I know very little geology myself'. Such statements as "marble which is formed from sandstone" and Mount Dandenong as a location for basalt are inexcusable in a book of this type.

Poor explanations of many basic concepts show a lack of understanding of these by the author and would make comprehension difficult for a reader with little background knowledge of the subject. This situation is not helped by diagrams like those supposed to represent crystals of feldspar and mica. Bad choice of examples for a number of the photographs along with poor reproduction in some of the colour plates also detracts from the value of the book to a beginner. A mistake occurs in plate 19 where jasper is labelled as cairngorm and cairngorm crystals are labelled as jasper. Photographs should help in identification of the rocks and minerals portrayed, but in certain cases in this book the specimens could not be identified without their labels! The worst example involving bad choice of specimens is a photograph labelled "Trilobite" which in fact only shows the pygidium (tail) of a trilobite. Not much better than this is a colour plate labelled "Pegmatite" which is certainly not recognizable as such.

Unfortunately, this book will put many wrong ideas in beginner's minds. Such ideas are often difficult to change.

A. W. Beasley,
Curator of Minerals,
National Museum of Victoria.

A Short Biography of William Mountier Bale F.R.M.S. (1851-1940)

Victorian Natural History Pioneer, His Bibliography and New Names List

By

BRIAN J. SMITH* AND JEANETTE E. WATSON†

During the latter half of last century, when much of the flora and fauna of the newly colonized continent of Australia and the seas around it were still unknown to science, Victoria was singularly fortunate in having a great many very capable amateur and professional natural scientists to describe the new forms and put the entire study of Australian natural history on a firm scientific footing. Some, such as Professor Baldwin Spencer and Professor McCoy, worked in very many fields, contributing significantly to them all; while others specialized in just one field of endeavour and, in many cases, became an authority in that field of study; such as Dr. A. Dendy on sponges, C. H. Mapleston on polyzoa and J. H. Gatliff on molluscs. Into this latter category should be placed William Mountier Bale F.R.M.S., one of the 56 original members of the Field Naturalists' Club of Victoria. He was an amateur microscopist who specialized in the Hydroida, a group upon which he became a world authority. He can rightfully be called the father of the study of hydroids in Australia as he published 14 authoritative papers on them in which he described over 120 new species and many new records for Australia.

William Mountier Bale was born on 1st February, 1851, at 11 Palace New

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Road, Lambeth, London, the eldest surviving son of William Dalling Bale, a carpenter from Devon, and Ellen Martha neé Mountier. The family sailed for Australia early in 1853 and came straight to Melbourne where they lived for the next seven years, as another son and two daughters were born in Richmond, Victoria in that period. They then moved to Castlemaine, Victoria where a further son and daughter were born in 1861 and 1864. Bale joined the Public Service on 1st August, 1867 as a Pupil Teacher at State School No. 282, George Street, Collingwood and passed in Art of Teaching, 2nd Division of Competency in 1869. He then taught until January 1876, after which he joined the Department of Trade and Customs as a Clerk, 4th Class. On November 3rd, 1873 he married Marion Adams. By September 1879 he had attained the position of Tide Surveyor and in 1888 was appointed Landing Waiter, 3rd Class. He was appointed Acting Landing Surveyor in 1901, Inspector 2nd Class, Landing Branch in 1904 and finally Senior Inspector Excise, Excise Branch, a position he held until his retirement on February 28th, 1911. Since 1885 he had been living in Walpole Street, Kew, the house still being held in trust under the will of his only child, the late Miss A. M. E. Bale.

It was, however, Bale's interest and dedication to microscopy and natural science which, we are sure, really gave meaning to his life. His first and abiding interest in life appears to have been microscopy and no-one who has examined any of his slides can doubt his skill in slide making, particularly whole mounts. He joined the Microscopical Society of Victoria in August 1878 and published his first scientific paper in the Journal of the Society in 1880 *"On Covering Fluid Mounts to avoid Leakage or Running-in"*. Also in this issue he published a paper *"On the Selecting and Mounting of Diatoms"*, giving a hint of his interest in this complex group of protophyta. However, although he became noted as an expert on local Victorian diatoms and amassed a great many slides, notes and reference works on the group, he never published anything on their systematics as far as we have been able to ascertain.

Bale was an advocate of the value of scientific societies and was one of the founder members of the Field Naturalists' Club of Victoria, being elected a member in May, 1880. Indeed he was the only one of the 56 original members to live to see the Club's diamond jubilee. He was not a frequent attendant of Club meetings and was said to have been of a retiring disposition, but was always friendly and willing to help (see *Vict. Nat.*, **57**, p. 140).

About this time he must have transferred his principal interest to the Hydroida for he published his first paper on the group in 1882, after reading it to the Microscopical Society of Victoria on June 30th, 1881. This was an authoritative paper which must have taken a great deal of preparation, for, in addition to describing one new genus and twenty-nine new species, he gave a complete literature survey of the species already described for South-eastern Australia and recorded many species for the first time for this area. At this time his interest in general microscopy and in the Microscopical Society of Victoria was still very great and he was elected secretary of the Society in 1882. Also in this year he read a paper on micrometers which included a simple method for making an eye-piece micrometer. This paper was published in the Southern Science Record and was considered of such high standard that it was reprinted in the Journal of the

Royal Microscopical Society of London, to which he was elected Fellow late in 1882.

However Bale was already specializing in the hydroids and after his paper, was receiving regular correspondence about Australian hydroids both from other parts of Australia and from many of the leading workers in the field overseas. As a result of discussions with Mr. Haswell of the Australian Museum, Sydney, the Trustees, on 27 November 1882, asked Bale to compile a Catalogue of Australian Hydroid Zoophytes and awarded him the sum of £25 to assist in compiling and writing the manuscript. This was a monumental undertaking, being not only a complete survey of all that was then known about Australian hydroids, but also a major original contribution to hydroid research, as it contained many new facts about their life and habits as well as many new locality records and descriptions of twenty-three new species. This work was hailed as a significant addition to the world knowledge of the group and established Bale as a world authority. Some idea of its importance can be gathered from the review of the Catalogue in *Ann. Mag. Nat. Hist.* of September 1885 in which it is stated, "It will thus be seen that the work is a valuable contribution to the literature on zoophytology, and will form an important landmark in the history of the Australian zoophytes".

He continued this work steadily until about 1910 when he was approached by the Department of Trade and Customs with a request to undertake the work on the hydroids to be collected by the F.I.S. "Endeavour" on a series of faunal surveys in deep water off the southern and eastern coasts of Australia. This Bale agreed to do and the result was a massive, comprehensive report in three parts brought out in 1914 and 1915. This included descriptions of two new genera and twenty-five new species and varieties, as well as much additional knowledge of the hydroid fauna and its systematic relationships. After this he continued his work for some years but failing health was beginning to make this difficult.

On 10 July 1923, he donated 336 hydroid slides, many of them types, and a complete catalogue of their history and status to the National Museum of Victoria. The co-types designated here were the only slides he ever specifically designated as such. In 1930 he was so incapacitated by encephalitis that he found it impossible to work with his microscope. His condition grew worse over the years and after refusing an offer by the British Museum to purchase his slides, he donated his entire hydroid slide collection of over 1100 slides to the National Museum of Victoria in March, 1937. It was his intention to catalogue this collection, identifying types, as he had done with the first series, but he found the task too much for him. Finally, in May, 1940, he donated nearly 450 books and reprints on hydroids to the National Museum and all his diatom slides, books and reprints to the Herbarium. He died on 4 October 1940, at the age of 89.

Recently, while carrying out research work on the Bale hydroid collection, one of us (JW) discovered that many of Bale's notes, original drawings and much of his correspondence with many overseas workers were still in existence, being held in trust under his daughter's will. These have now been acquired on loan to the National Museum from the Executors and will be of considerable assistance in research on the collections including the elucidation of many of the type specimens.

References marked with an asterisk (*) are papers containing the original publication of a new name.

1880

1. On Covering Fluid Mounts to avoid Leakage or Running-in. *J. microsc. Soc. Vict.*, **1**: 57-60. Reprinted in slightly abridged form in *Jl. R. micros. Soc.*, **3**: 864-866.
2. On Selecting and Mounting Diatoms. *J. microsc. Soc. Vict.*, **1**: 65-69.
3. Notes on Insect Eggs. *J. microsc. Soc. Vict.*, **1**: 69-71.

1882

4. On Mounting Diatoms in Symmetrical Groups. *J. microsc. Soc. Vict.*, **1**: 97-99. 97-99.
5. Notes on Dry and Balsm Mounting. *J. microsc. Soc. Vict.*, **1**: 101-105.

*6. On the Hydroida of South-Eastern Australia, with Descriptions of Supposed New Species, and Notes on the Genus *Algaophenia*. *J. microsc. Soc. Vict.*, **2**: 15-48, pl. 12-15.

7. On Recent Improvements in Microscopy. *Sth. Sci. Rec.*, **2**: 75-80.

1883

8. How to Make an Eye-piece Micrometer. *Sth. Sci. Rec.*, **3**: 13-16. Reprinted in slightly abridged form in *Jl. R. micros. Soc.*, (2) **3**: 570-572.

1884

*9. Catalogue of the Australian Hydroid Zoophytes. *Australian Museum Publ.*, pp. 1-198, pl. 1-19.

10. Closing Glycerine Cells. *Jl. R. micros. Soc.*, (2) **4**: 478.

1887

*11. The Genera of the Plumulariidae with Observations on Various Australian Hydroids. *Proc. R. Soc. Vict.*, **23**: 73-110.

1888

*12. On Some New and Rare Hydroida in the Australian Museum Collections. *Proc. Linn. Soc. N.S.W.*, (2) **3**: 745-799, pl. 12-21.

1889

13. List of Victorian Hydroida. *Vict. Nat.*, **5**: 130-133.

1894

*14. Further Notes on Australian Hydroids, with Descriptions of Some New Species. *Proc. R. Soc. Vict.*, (n.s.) **6**: 93-117, pl. 3-6.

1913

*15. Further Notes on Australian Hydroids—II. *Proc. R. Soc. Vict.*, (n.s.) **26**: 114-147, pl. 12-13.

1914

*16. Report on the Hydroida collected in the Great Australian Bight and other Localities. *F.I.S. "Endeavour" Report*, **2**: 1-62, pl. 1-7.

*17. Report on the Hydroida collected in the Great Australian Bight and other Localities. Part II. *F.I.S. "Endeavour" Report*, **2**: 166-188, pl. 35-38.

*18. Further Notes on Australian Hydroids—III. *Proc. R. Soc. Vict.*, (n.s.) **27** (1): 72-93, pl. 11-13.

1915

*19. Report on the Hydroida collected in the Great Australian Bight and other Localities. Part III. *F.I.S. "Endeavour" Report*, **3**: 241-336, pl. 46-47.

1919

*20. Further Notes on Australian Hydroids—IV. *Proc. R. Soc. Vict.*, (n.s.) **31** (2): 327-361, pl. 16-17.

1922

*21. Two New Species of Bryozoa. *Proc. R. Soc. Vict.*, (n.s.) **35**: 108-113, pl. 8.

1924

*22. Report on some Hydroids from the New Zealand Coast, with Notes on New Zealand Hydroida generally, supplementing Farquhar's List. *Trans. N.Z. Inst.*, **55**: 225-268.

1926

*23. Further Notes on Australian Hydroids—V. *Proc. R. Soc. Vict.*, (n.s.) **38**: 13-23.

This list is set out alphabetically according to species with the original genus name included. The first of the two numbers after each name is the number of the paper in the bibliography in which the original description appears, the second number is the page number in that publication. The abbreviation (n.n.) after the name denotes a new name (nomen novum) put forward by Bale to replace an invalid name of an already described species. The asterisk (*) before a name denotes that at least part of the type series is present in the collections of the National Museum of Victoria. As mentioned briefly above, Bale did not designate type specimens in the species descriptions; however, for some species, he did identify type specimens in notes he donated to the Museum when he presented the specimens in 1923. Of the species without such identified specimens, it is fairly easy to recognize, by elimination, specimens which must have been part of the type series, by the locality and date on the slides. It is planned in the future to publish a catalogue of all the hydroid types held by the National Museum with complete information as to their exact status.

acanthostoma Sertularia 6: 11
* aglaophenoides Plumularia 9: 126
* alata Plumularia 12: 782
* angulata Cryptolaria 17: 166
* angulata Orthopyxis 18: 82
* angulosa Obelia 12: 752
* angulosa Sertularella 14: 102
* arenosa Sacculina 20: 333
* armata Aglaophenia 17: 175
* ascidioides Aglaophenia 6: 20
* asymmetrica Plumularia 16: 29
* aurita Plumularia 12: 784
* australis Halocordyle 14: 94
* australis Ophiodes 20: 336
* australis Pennaria 9: 45
* avicularis Halicornopsis 6: 14
Azygoplon 12: 773
* baileyi Halicornaria 9: 177
* bakeri Aglaophenia 20: 353
* bicornis Sertularia 6: 10
* bidens Sertularia 9: 70
* billardi Aglaophenia 16: 33
* birostrata Halicornaria 16: 49
Bonneviella 20: 330
* briggsi Aglaophenia divaricata 23: 22
* buskii Plumularia 9: 125
* caliculata Plumularia 12: 780
* calycifera Aglaophenia 17: 178
* carinata Aglaophenia 14: 105
* carinifera Aglaophenia 17: 181
* chiltoni Thecocarpus 22: 261
* ciliata Nemertesia 17: 170
Cladocarpella 19: 303
* compressa Plumularia 6: 31
* cornuta Plumularia 9: 132
* costata Campanularia 9: 56
* coughtreyi Obelia 22: 230
* crassiuscula Sertularella 22: 240
* crenata Sertularia 9: 86
* cruciata Nemertesia ciliata 19: 300
* cylindrica Antennularia 9: 146
* cylindrica Sertularella 12: 765
* cystifera Aglaophenia divaricata 19: 314
* dannevigi Aglaophenia 16: 41
* decumbens Aglaophenia 16: 48
* distans Hypopyxis 17: 167
* delicatula Plumularia 6: 28
* dubia Sertularella divaricata 12: 761
* edentula Sertularella 22: 237
* farquhari Thuiaria 22: 244
* fenestrata Thuiaria 9: 116
* flexuosa Lineolaria 9: 62
* flexuosa Plumularia 14: 115
* furcata Halicornaria 9: 178
* geminata Sertularia 9: 78
* geniculata Sertularia 12: 768
goldsteini Claviporella 21: 112 (n.n.)
* goldsteini Plumularia 6: 29
* gracile Halecium 12: 759
* gracillima Sertularia 23: 18
Halicornopsis 6: 14
* haswellii Halicornaria 9: 180
* heterogona Thecocaulus 22: 255
humilis Campanulina 22: 235
* humilis Halicornaria 9: 182
* hyalina Plumularia 6: 29
* ilicistoma Aglaophenia 6: 21
indivisa Plumularia 6: 27
* indivisa Plumularia filicaulis 9: 134
* indivisa Sertularella 6: 12
* intermedia Halicornaria 16: 53
* laevis Sertularella 6: 12
* lata Thuiaria 6: 14
lendenfeldi Aglaophenia 11: 28 (n.n.)
Levinsenia 19: 260
* longitheca Sertularella 12: 762
* macrocarpa Aglaophenia 12: 791
* macrocarpa Sertularia 9: 80
* macrotheca Sertularella 6: 13
* maplestonei Sertularia 9: 70
* marginata Campanularia 9: 54
* matthewsi Catenicella 21: 109
* mccoyi Aglaophenia 6: 24
* megalocarpa Aglaophenia 16: 45
minuscula Sertularia 20: 340 (n.n.)
* minuta Sertularia 6: 9
* muelleri Sertularia 15: 133

* multiseptata Cladocarpella 19: 304
* nana Sertularia 23: 17
* nodosa Obelia 22: 230
* opima Plumularia setacea 22: 254
* parvula Aglaophenia 6: 23
* parvulum Halecium 12: 760
* peregrina Sertularella 23: 19
* phyllocarpa Aglaophenia 12: 793
* platycarpa Orthopyxis 18: 79
* plumosa Aglaophenia 6: 22
* pulchella Plumularia 6: 30
pumila Campanularia 16: 4
pumiloides Sertularia 6: 9
pusilla Sertularia 19: 271 (n.n.)
* pygmaea Sertularella 6: 13
* quadridens Thuiaria 9: 119
* ramsayi Plumularia 9: 131
recta Sertularia 6: 11
* rostrata Halicornaria 22: 264
* rufa Campanularia 9: 54
Sacculina 20: 332
* scandens Halicornaria urceolifera 16: 51
* scandens Lafoea 12: 758
* serrulata Campanularia 12: 757
* setaceoides Plumularia 6: 28
* sinuosa Aglaophenia 12: 790
* sinuosa Thuiaria 12: 772
* solidula Sertularella 6: 12
* spinulosa Campanularia 12: 756
* spinulosa Plumularia 6: 30
* subdichotoma Sertularella divaricata 12: 761
* subventricosum Synthecium 16: 5
* superba Aglaophenia 6: 19
* tasmanica Aglaophenia 16: 37
* tasmanica Sertularella 19: 283
* tenuis Sertularia 9: 82
* tenuissima Aglaophenia 17: 179
thompsoni Aglaophenia 6: 21
* tridentata Campanularia 14: 98
* tuba Sertularia 9: 87
* tubulifera Halicornaria 17: 187
* tubulosa Plumularia 14: 114
* turgida Plumularia 12: 779
* undulata Sertularella 19: 284
* variabilis Sertularella 12: 764
* wattsii Plumularia 11: 23
* whiteleggei Aglaophenia 12: 794
* wilsoni Orthopyxis 18: 78
wilsoni Pennaria 15: 116
wilsoni Plumularia 23: 21 (n.n.)
* zygocladia Plumularia 17: 171

Acknowledgments

We wish to express our thanks to Mr. Stokes, a nephew of Mr. Bale now living in Mr. Bale's house in Kew, for all his assistance in furnishing us with many old family records; also to the Perpetual Executors and Trustees Association of Australia for making it possible to use Mr. Bale's original notes; and the following for their assistance in supplying various pieces of information: Dr. J. Yaldwyn, Australian Museum, Sydney; Mr. J. Willis, National Herbarium of Victoria; Commonwealth Archives Office, Middle Brighton, Victoria; Commonwealth Archives Office, Canberra; Education Department, Melbourne and the General Register Office, Somerset House, London, U.K.

The photograph of Mr. Bale was from an original supplied by Mr. Stokes.

NOTICE

Dr. D. H. Ashton and Mr. N. Scarlett from the School of Botany, University of Melbourne, are preparing a map of the Melbourne and Metropolitan area, showing the occurrences of Eucalyptus species or other native trees, with a view to reconstructing the limits of the original vegetation.

Any member or person able to help in this matter should contact either of the above-mentioned people.

The main species required are—
Red Gum—*E. camalulensis*
Yellow Box—*E. melliodora*
Yellow Gum—*E. leucoxylon*
Swamp Gum—*E. ovata*
Manna Gum—*E. viminalis* (heath and gum forms)
Peppermint—*E. radiata*
Mealy Stringy Bark—*E. cephalocarpa*
Messmate—*E. obliqua*
Grey Box—*E. microcarpa*
Red Stringy Bark—*E. macrorrhyncha*
Red Box—*E. polyanthemos*
White Sallee—*E. pauciflora*

Wielding a Big Club

"My boy collects insects and things; what should I do about it?"

This familiar question posed by many mothers resulted in the formation of a Junior Field Naturalists' Club last week, at Montmorency. Victoria.

It happened something like this: One mother, having the usual problems associated with an enthusiastic "entymologist" for a son, (the sudden shortage of jars from the kitchen, the bedroom full of impaled specimens, the pins disappearing from the sewing box) discussed it with another mother who had a similar headache (the hunt for escaped catches under the furniture, the blue-tongued lizard leering at her from her clothes basket), and an idea was born.

One evening, nine parents met to talk over the possibility of such children with a similar interest, sharing their experiences locally, and the nucleus of a committee was formed with the idea of convening a meeting.

The usual story followed. The advertisement was placed in the local paper, hidden between the classifieds and the sports pages; the news was spread by word of mouth; the announcement was made at school; the Scout Hall was booked; the guest speaker arranged; and the fingers crossed.

And then the avalanche. I now know why they call it a Club. After the enthuisasts began pouring in, I felt as though I had been beaten over the head. Despite the humble organization, the untimely downpour; and the acres of mud to traverse; one hundred and thirty-five would-be Field Naturalists of all shapes and sizes filled the hall, and queued up at the Secretary's table to list their names.

At the long tables in the centre of the room, they reverently placed their labelled exhibits—

A black snake. A box of seashells. A stalactite. Rocks from South America. Giant mushrooms. A reconstructed bird skeleton. A red-back spider, butterflies, lizards, caterpillars. A lively brown snake. A sluggish white-lipped snake. Dragonflies. Lava specimens. The queue at the door disappeared out into the night, and the organizers kept glancing at their watches, wondering if they should have booked the Myer Music Bowl.

Soon the meeting began, with stragglers arriving throughout. Mr. Dan McInnes, of the Hawthorn Club, agreed to conduct the meeting for the first time to set the pattern, showing how it was done on his side of the Yarra; and after the general business was disposed of, the young exhibitors took the floor in rotation, and introduced themselves and their exhibits one by one to the enrapt audience. Some of the descriptions were detailed and precise. Some were homely. But all shared one thing; enthusiasm and unselfconscious pride in their discovery in nature. The eyes around the room were all focused on the speakers, who ranged from eight to eighteen, and the wonder of it was that the eight-year-old and the eighteen-year-old had so much in common.

After the exhibitions, Mr. McInnes as guest speaker, set up his microscopes and specimens, and introduced pond life to the group in a light and easily absorbed talk. Demonstrating both simple and sophisticated equipment, Mr. McInnes (perhaps knowingly) made certain that quite a few Montmorency mothers were going to have to deal with wet socks that week-end.

President Ray Wilton resumed the chair and closed the meeting, but the next problem was getting people to go home. At an earlier stage, Dan McInnes had said that Juniors present

would be able to tell their children that they had attended the first meeting of the Montmorency District Field Naturalists' Club. A committee member was later heard to remark wryly—"This lot is so keen, they won't have time to have any children!"

Again our sincere thanks to Dan McInnes and the members of Hawthorn Juniors, who tabled so many exhibits, and to the first-mentioned mother, Mrs. Cookson, who, through her children's association with Preston Juniors, was the prime mover in the formation of this Club.

The guest speaker for the meeting on 11 April will be Mrs. Hough, who will talk on Honey-eaters.

JOAN CALLANDER, Secretary.

OFFICE-BEARERS

Montmorency District Junior Field Naturalists' Club

President: Ray Wilton
Vice-President: Ron De Bruchy
Secretary: Joan Callander
Treasurer: Lorna Cookson
Committee: Dawn D'Alton, Joyce Howard, Ron Callander.

Field Naturalists Club of Victoria

Annual Meeting—12 March, 1969

Approximately 80 members attended, with the President, Mr. Eric Allan, welcoming them and any visitors to the 89th Annual Meeting. The minutes of the February meeting were taken as read after the motion of Mr. A. Swaby and Mr. A. Fairhall was passed.

The minutes of the previous Annual Meeting, as published in the *Vict. Nat.* for April, 1968, were taken as read on the motion of Mr. R. Garnet and Mr. W. Woollard.

New members, whose names appear ing the March 1969 *Vict. Nat.*, were elected on the motion of Messrs. McGavin and McKellar.

Correspondence was received from the National Parks Authority, stressing the importance of Regulation 36 of the National Parks Act 1958; which in general states that—

No person shall remove any bones, remains, artifacts or other ethnological relics from any National Park without permission from the Authority.

Further correspondence was received from Miss Mary Ball, who, although having been conferred with honorary membership of the club, still wishes to pay her subscription of $5.00 because of the Club's good work.

On the motion of Miss Butchart and Miss Morley the meeting accepted the Secretary's Annual Report as printed in the *Vict. Nat.* Mr. A. Swaby, at this point, commented that more liaison between the F.N.C.V. and affiliated country clubs should be encouraged. He added that country members had the environment for field study, and that we in the city had the facilities and libraries for research.

Mr. D. McInnes moved, and Mr. T. Sault seconded the motion for the adoption of the Balance Sheet and Statements as published in the *Vict. Nat.*, and the meeting approved.

Mr. McInnes commented on the excellent work done by Mrs. J. Strong in her position of Sales Officer, and that of Mr. P. Kelly as librarian.

Mr. McInnes then moved the same Auditors, Messrs. Danby Bland and Co., be appointed for the coming year.

Election of Office-bearers

Since the list of nominations was published, Mr. M. Longford, for personal reasons, had to withdraw from the nominated position of Minute Secretary. Mr. Condron therefore resumed this position, leaving the Council to appoint Mr. R. McKellar to the position of Vice-President.

The F.N.C.V. Office-bearers for 1969-70 are:

President—Mr. E. R. Allan.
Vice-President—Mr. T. Sault.
Mr. R. McKellar.
Secretary—Mr. D. Lee.
Assistant Secretary—Mr. R. Condron.
Treasurer—Mr. D. McInnes.
Assistant Treasurer—Mrs. E. King.
Editor—Mr. G. M. Ward.
Assistant Editor—Mr. P. Gahan.
Librarian—Mr. P. Kelly.

Assistant Librarian—Miss M. Lester
Excursion Secretary—Miss M. Allender.
Residual Councillors—Messrs. A. Fairhall, A. Lewis, I. Morrison, J. Strong, P. Curliss.

The President, at this stage, thanked the Office-bearers and Councillors of the past year, and commented upon the amount of valuable work done by them.

The Secretary announced that current copies of the F.N.C.V. "Memorandum and Articles of Association" were now available at a cost of 35 cents. Miss J. Woollard had several copies of the excellent "Nature Trail" pamphlet, from The Gould League at 2 cents each.

The Presidential Address followed, and took the form of a glimpse of the F.N.C.V. in the past; an evaluation of the club at present; and a hopeful look into the future.

From the past, Mr. Allan brought to light such things as the beginning of the F.N.C.V. in 1880, with their first three years of proceedings being published in the "Southern Science Record"; the names of early members, such as Baron F. von Mueller, Dr. Lucas as editor, and Mr. Dobson, M.L.C., as President. The name of Coghill came into the early years of the club and continued until 1967. In 1884 approaches were already being made to the government regarding matters of concern—boys with catapults were shooting at birds in the Fitzroy Gardens. In the same year, Gregory and Lucas made an early visit to Wilson's Promontory, using the steam train to Trafalgar, and thence by pack horse. In 1887 an excursion to King Island was made.

F. G. A. Barnard, in 1892, became editor; and in 1893 the first nature show was held with admission being 1/-. By 1894 membership had risen to 229, and the *Victorian Naturalist* was already being sent to overseas subscribers; and from the turn of the century on, "camp-outs" were becoming quite regular events.

In 1928, a change was made in the club badge, from the form of a shell to the present bloom of correa; and in 1939 the proposal and appearance of the National History Medallion award took place.

The venue for meetings was changed in 1948 from the National Museum Theatrette to the National Herbarium, and the club became an Incorporated Company.

This brought the President to comment on present conditions, in which the club is in a generally healthy state; is still a force in the community; and the field excursion still forms an important facet of proceedings.

One problem, however, does arise, and this is the difficulty in obtaining office-bearers.

In the future, the President stressed the importance of our continued vigilance, and the need to press for more areas for the preservation of fauna and flora. He hoped that replanting of roadside verges now being denuded of trees would be undertaken. He considered the possibility of large scale planting of areas on a similar basis to the annual Bird Observers' Club tree-planting operation; together with the encouragement of farmers to realize the benefits of tree-planting on their properties.

He also hinted at the possible formation of a Union of Field Naturalist Clubs which may have more effect in the influencing of major groups; and at the same time prevent much overlapping of information and research. It was also suggested that perhaps a new position, that of Liaison Secretary, may be created on Council.

Mr. Allan concluded this most interesting address with a fine collection of

F. G. A. Barnard

slides, projected by Mr. I. Morrison, depicting his trip* to Wilson's Promontory; and showing glimpses of the vegetation and rugged beauty encountered travelling both to Sealers' Cove and the lighthouse.

The appreciative audience showed their feelings by loud applause at the conclusion of the address.

Mr. W. Woollard at this stage, no doubt prompted by the earlier reference to pack-horse travelling, recalled a trip made by his father, himself as a boy, and Mr. F. G. A. Barnard, in 1906.

He told of their trip to Yarra Glen by a pair in hand, and of the comment by a local storekeeper at that town, that their particular outfit would never make Warburton; and insisted that he hire a pair of horses and a driver for 10/- per day. This offer was accepted, only to find that not long afterwards one of the horses had collar sores, and the other was broken winded. The trip from McVeigh's to Yarra Falls had then to be made by pack-horses.

Under the heading of General Business, Mr. Baines suggested that publication support be given for a book on the flora of Wilson's Promontory, under preparation by Ros Garnet, and now almost completed. Mr. Taylor drew attention to a brochure on the Mallacoota National Park, obtainable from the National Parks Authority or Tourist Bureau for 20 cents.

Exhibits

M. North showed a bloom of the green variety of *Correa reflexa* from Jumping Creek Road, Warrandyte.

D. M. Parkin exhibited a cone from the Burrawong Palm (*Macrozamia*), a native of Australia growing in southern N.S.W. This particular cone was from their own tree, planted at Ivanhoe in 1927. The first cone appeared 20 years later, weighed 9 lb., and took 18 months to mature. (Ref. Wildlife, Sept. '44.)

Two Amy Fuller paintings of wildflowers were on display.

Mr. A. J. Swaby displayed a bloom of *Rhododendron lochae*, the plant whose location Baron v. Mueller prophesied correctly, 20 years before its discovery on the peaks of Bellenden Ker Range in Queensland. Also displayed by Mr. Swaby was *Epilobium billardierianum*, and a seed of *Crinum flaccidum* (Murray or Darling "lily"), the progress of germination of which he would show at the April meeting.

Mr. T. Sault displayed a specimen of Snowflake Obsidian from South America; some Selwynite from Knowsley East in Victoria, together with Malachite from the same location. He also showed the skull of a Black-tailed Wallaby from the coastline of Westernport area. He stated that the future of these animals in this area was uncertain due to development.

Mrs. E. King exhibited a specimen of *Acacia botrycephala* (Sunshine Wattle) syn. *A. discolor*.

Mr. A. Fairhall showed two fine garden-grown specimens of Sturt's Desert Pea (*Clianthus formosus*) and Sturt's Desert Rose (*Gossypium sturtianum*).

The President displayed photographs of early club camp-outs; and drew attention to the bird photographs appearing on current country telephone directories.

An account of the first younger members' bush-walk, held in the Moorooduc area and led by Mr. T. Sault, was tabled for perusal by members.

* This particular trip, unlike that of Gregory and Lucas, was not done by steam train and pack-horse.—Ed.

Botany Group Meeting Reports

13 February, 1969

Twenty-five members and friends were present, with Mr. Fairhall in the chair. The speaker for the evening was Mr. W. Woodman, whose subject was "Nature in South Africa". Mr. Woodman said that as a boy he had been interested in native flowers, and showed some slides of Victorian native flowers and their environment. He felt that South Africa showed something the same sort of pattern as Australia, and when the opportunity came he decided on a tour of South Africa, calling at Johannnesburg, Durban, Capetown and Windhoek. He showed some excellent slides of scenery and flowers seen during his trip, including some of Australian Eucalypts and N.S.W. Waratahs which were flowering well in the Kirstenbosch Gardens, and included slides of various Proteas, which are of course natives of South Africa. He finished his talk with some slides taken in the Etosha Game Reserve at Windhoek, including elephants, lion, giraffe and others. Mr. Fairhall thanked Mr. Woodman on behalf of members for a very interesting talk.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 April—Annual Meeting at National Herbarium, The Domain, South Yarra; Commencing at 8 p.m.

1. Minutes, Reports, Amendments.
2. Correspondence.
3. Subject for the evening—"Melbourne to Broome via Adelaide". J. Ros. Garnet.
4. New Members
   (a) *Ordinary:*
   Mr. Adrian Borsboom, 39 Springs Road, Clayton 3168. (Interest: Fauna, Reptiles and Insects.)
   Mr. R. A. Dale, 88 Rostrevor Parade, North Box Hill 3129. (Mammal Survey.)
   Mrs. R. B. Johns, 19 Kawarren Street, North Balwyn 3104. (Botany and Geology.)
   Mr. W. Scholten, 10 Boyd Avenue, Clayton 3168. (Microscopic.)
   (b) *Joint Ordinary:*
   Mr. G. A. W. Johnson and Mrs. Irene Johnson, 20 Sydare Avenue, Chadstone 3148.
   (c) *Country:*
   Miss J. Collishaw, P.O. Box 427, Bendigo, Victoria 3550.
5. General Business.
6. Nature Notes and Exhibits.

GROUP MEETINGS

8 p.m. at National Herbarium unless otherwise stated.

Wednesday, 16 April—Microscopical Group. Subject—"Marine Algae; its identification and preparation for Microscopical Examination". Mrs. F. Ducker.

Thursday, 1 May—Mammal Survey Group meets in Fisheries and Wildlife Dept. Library Rooms, Flinders Street Extension, at 7.45 p.m.

Friday, 2 May—Preston Junior F.N.C. meeting in Rechabite Hall, 251 High Street, Preston at 8 p.m. Also, Hawthorn Junior F.N.C. meeting at 8 p.m. in Town Hall because of Anzac Day falling on usual night.

Monday, 5 May—Marine Biology and Entomology Group. Mr. H. Wilson, Burnley Horticultural College.

Wednesday, 7 May—Geology Group meeting.

Thursday, 8 May—Botany Group meeting.

Friday, 9 May—Montmorency District Junior F.N.C. meeting in Scout Hall, Petrie Park.

F.N.C.V. EXCURSIONS

Sunday, 20 April—Mt. Dom-Dom and Fernshaw. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.60. Bring two meals.

Friday (Anzac Day), Saturday and Sunday, 25-27 April. Leongatha and Walkerville. Mr. and Mrs. Lyndon are helping with this week-end. Accommodation has been booked at the Leongatha Motel for Friday and Saturday at $5.50 for bed and breakfast. Dinner is available at the motel, but members should arrange picnic lunches for the week-end. Coach fare is $7.00, and should be paid to the Excursion Secretary when booking. Cheques should be made out to Excursion Trust. Coach leaves from Gas and Fuel building in Flinders Street at 9.00 a.m.

29 August-21 September—Western Australia. The party will leave Melbourne by train on Friday evening and arrive in Perth Monday morning. A coach has been chartered and will go as far north as Northampton, then down to Albany, across to Busselton, and back to Perth. Accommodation will be mainly on a D.B.B. basis, and members will be responsible for their own lunches. The cost will be approximately $260.00, and a deposit of $50.00 should be paid immediately, and the remainder by 1 August. Booking should be made with the Excursion Secretary, Miss M. Allender, 19 Hawthorn Avenue, North Caulfield, 3161, and all cheques made out to Excursion Trust.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

President:
MR. E. R. ALLAN

Vice-Presidents: MR. JEFFS, MR. T. SAULT

Hon. Secretary: MR. D. LEE, 15 Springvale Road, Springvale (546 7724).

Hon. Treasurer: MR. D. E. MCINNES, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: MRS. N. E. LEWIS, 1 Billing Street, Springvale 3171. (546 4649).)

Sales Officer: MR. B. FUHRER, c/o National Herbarium, The Domain, Sth. Yarra.

Group Secretaries:

Botany: MISS M. BUTCHART, 23 Loch Street, Hawthorn East 3123 (82 1616).

Geology: MR. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House. Melbourne 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1969

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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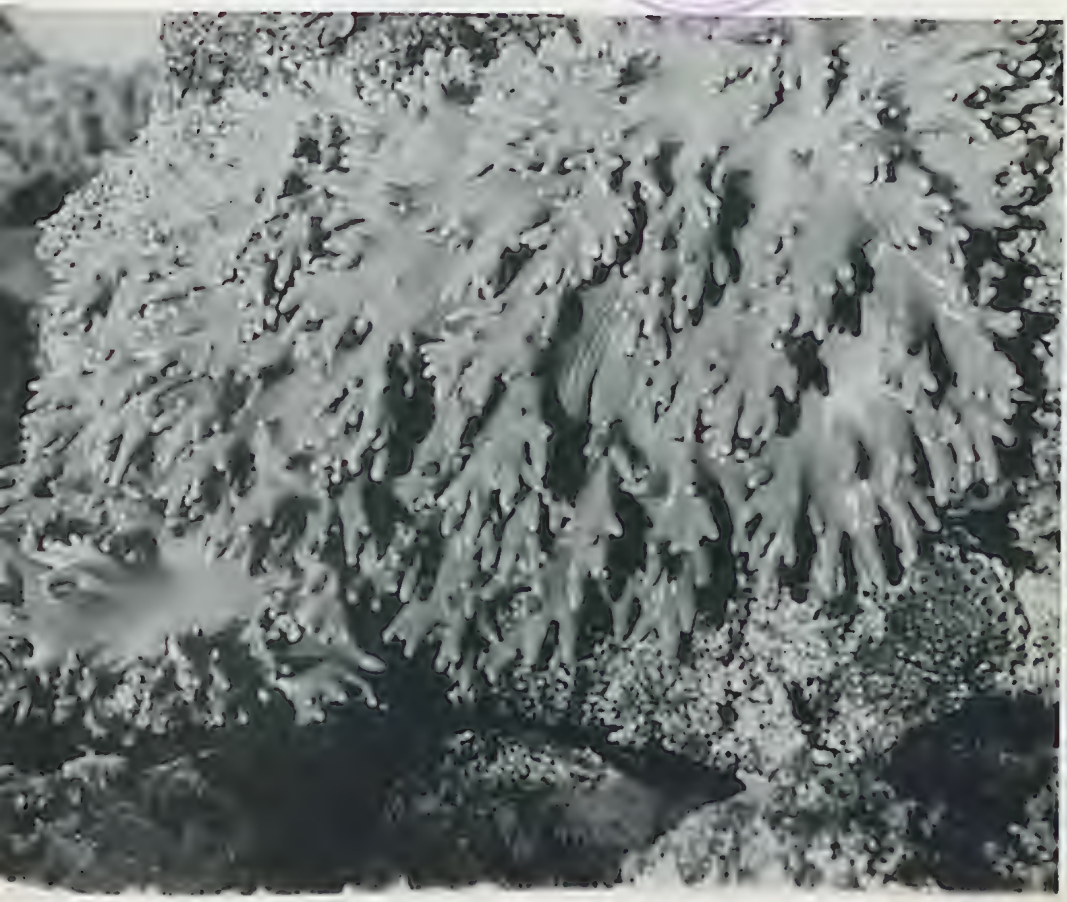

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F.N.C.V.

Vol. 86, No. 5 8 May, 1969

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The photograph is of Soft Coral (*Sinularia*), taken at Gantheaume Pt., Broome, W.A. by Alan Owen.

Wandering o'er the Mallee and Riverina

by Margaret Sympson

It was rather gloomy on 12 October as we left Melbourne in the morning for the north. When Bendigo was left behind, it was getting much better; with a cloudless sky, and being much warmer. Nearing Kerang, stretches of water were apparent in the paddocks; and when we saw a large congregation of white birds over one of these, we stopped. White and strawnecked ibis were feeding quietly on the edges of the water, silver gulls were swimming and strutting about aggressively. A Gull-billed Tern, Marsh Terns, and White-winged Black Terns were flying around a great deal, and diving for food in the shallow water; whilst White-headed Stilts were more sedate about their feeding. The one and only gull-billed tern gave us some very interesting views of itself as it dived very close to where we were.

Our destination that night was Mystic Park, so we pressed on, arriving in good time to find a camp site, and put up our tent. Next day we called on friends nearby, who grow grapes and citrus fruits, as well as lovely roses; and are also renowned bird watchers. Mr. Vic Lowe and his son Tom, took us off to Lake Tuchiwop before lunch to find waders. This lake is filled with salt water, which is being drained into it by canals bringing this salty water from a nearby river, which in turn flows on to the Murray. This scheme is to prevent it from polluting all other water courses into which it might seep. We saw the usual sandpipers and stints, but nothing uncommon. Tom Lowe suggested we try and find an Orange Chat, which we had never seen, so we drove over a low salt bush incline from the lake, and almost immediately saw this bird! It was a most brilliant creature, with flowing orange head and shining yellow breast, plus a black throat. Here, on another bush was a female; and over there, another male! This was truly exciting. They were flitting about this place, showing not the slightest fear of us. After a few minutes of good observing from the car, we moved off, because we thought this may have been their chosen nesting site.

Then, as I announced that I had never seen a Crimson Chat either (my husband had), off we went to higher more grassy ground, and sure enough, there they were, quite a flock. They are equally as beautiful, but have more brown with their crimson. Later on, further north in N.S.W., we saw many more Crimson Chats, but only one more Orange Chat near Lake Cargelligo; again inhabiting salt bush and box thorn in an open paddock.

We parted at lunch, to meet again for the evening. Our hosts suggested we drive through their series of marshes. As we had an area map we set off looking for Australian Dotterels, which we did not find. However, we found other things. We were particularly pleased with seeing three species of wood swallows, the White-browed, White-breasted, and Black-faced that afternoon. The only eucalypts that I knew of, growing in these swamps, was the Black Box confirmed by Mr. Lowe. Not all these swamps have water in them, and

some were just filling because the rivers were overflowing for a change.

Among the birds we most enjoyed were the two species of chat, the Blue and White Wrens, Regent Parrots, Black-fronted Dotterels, Blue-billed Ducks on Kangaroo Lake, Striped Honeyeater in a nest like a silk purse in Mr. Lowe's garden, Tawny Frogmouth nesting nearby over our tent in a weeping willow tree. Brown Song Lark, large flocks of Cockatiels, Budgerigahs and Banded Plovers.

Altogether we totted up 73 species for our week-end at Mystic Park.

Next morning we said good-bye to the Lowes, who were out early in force, harvesting their lemons. They loaded us with oranges and grapefruit most generously, and waved us off. Later on, when we struck a heat wave, how thankful we were to have them.

Our final destination was Round Hill Faunal Reserve, 30 miles from Lake Cargelligo, and 17 miles from Mt. Hope. To get there we crossed the river at Barham, stopped near Deniliquin with more friends for the night, and proceeded north through Jerilderie, Griffith, Rankin Springs, Lake Cargelligo, and then north-west; crossing the Lachlan river, and another called Booberoi Creek, which was about 20 miles from the camp. As we journeyed on from Deniliquin, the temperature became hotter and hotter. A long, hot plain, covered with yellow and white helichrysums, led us to Darlington Point on the Murrumbidgee. After Griffith, the countryside became more Mallee covered, with ranges of low hills on the horizon, rising straight out of the plain. These hills seemed to be rocky, rather than sandy. From Rankin Springs, very large tracts of forest emerged, all of the Callitris species. Round Hill is also of the same quartz type of rock, rising out of flat, red Mallee sand.

We camped in an area of semi-cleared "Wilga" (*Geijera parviflora*), and Callitris species. Attempts had been made years ago to graze animals, but the dams dug were not able to hold water—such a pity, so well dug, too. Surrounding this area, the Mallee eucalypts stretched to the edge of the Reserve, which occupies about 25,000 acres. The road cuts diagonally through the Reserve, one side being now covered with low regenerating mallee, which was burnt 10 years ago in a bush-fire, and the other side, apparently saved, was still virgin. It was once the haunt of the Mallee Fowl, but none has been seen since those fires.

Camp-site amidst Wilgas (left) and Callitris. *photo: Author.*

The company of bird watchers assembled, about 30 in all, did several beats through the scrub to see if we could find anything. Several very old spreading mounds were found, but not a sight of any Lowans. However there were plenty of other species seen. The R.A.O.U. were particularly keen on finding nests, so campers looked for them every day as well as checking on the ones already found.

As the temperature was over 100°F every day, and the flies excrutiatingly irritating on our bare skins, it was quite an effort to leave a shady tree to look for a nest, let alone lift binoculars to scan the trees. After 9 a.m. I usually sat myself in a chair, and watched from under a Callitris tree, and observed Western warblers nesting nearby, a pair of Red-capped Robins carrying food, Jacky Winter, Owlet Nightjar looking every now and then from its day roost in a hollow spout, Ring-neck parrots, flocks of Apostle Birds noisily passing through, and White-winged Trillers.

On our first day we came upon two Spotted Bower Birds making a frightful din near a bower. When they saw us they flew away, so we inspected the bower and found a very nicely made one under sapling Callitris trees still in their juvenile blue stage. Small paddy melons, and green and blue pieces of glass were decorating the outer platform at one end. Another one was found nearer the camp, where photographers in the party put up a hide.

After three days my husband and I decided we must go into Lake Cargelligo, the nearest town 30 miles away, and have a bath and a change of clothes. The journey back was so dusty that we really felt we had never had the bath. However, on a vast flat plain, again covered in yellow and white helichrysums, we found three pairs of Australian Pratincoles fraternizing with 12 Banded plovers. The pratincoles were again a new bird to me. Crossing a small bridge where box thorn and salt bush grew, were blue and white wrens, crimson chats and one orange chat mentioned earlier. The Booberoi Creek was a pleasant spot to stop and have lunch, and dabble hot feet. Red gums lined the banks, which were filled with twittering and jostling budgerigahs, continually diving into the water to drink, and even have a splash. There was a pair of Rufous Song Larks singing nearby. It was a very pretty song; and they paused now and then to eat large grubs found in the tree. A Black-tailed Native Hen was finally flushed from the bullrushes where it had been trying to hide from us for some time. Next minute there was a lot of scratching noises behind us, where an enormous brown and yellow tailed goanna went shinning up a tree. Further along the road back to camp, Blue Bonnet Parrots were seen flying across open paddocks dotted with Wilga trees, to settle amicably with Galahs. When we were going through the reserve, we stopped to watch a very large flock of Masked Wood Swallows diving about over the regenerating Mallee, and calling to each other continuously. One bird was beautifully patterned with white spots along its wings and over its back. It turned out to be a well grown fledgling still being fed. Also among them were White-browed Wood Swallows but not many.

Another new bird for both of us, found at the camp, was the Black Honeyeater. It was first seen on a tall orange-red flowered eremophila bush, almost a small tree. The long tube flowers were most popular also with the Yellow Plumed Honeyeater, White-eared, Spiney-cheeked, and White-faced Honeyeaters. The Black Honeyeater was later found to be nesting. The male is a most striking little

Booberoi Creek, 20 miles from Round Hill.

photo: Author.

bird, with black head and white body; while the female is just a brown bird. There was another eremophila bush flowering in the area, a big low spreading bush with dark green leaves and a short red tube on the flower. The yellow and white helichrysums were again all over the camp site, which was very dusty and dry. There were disappointingly very few wild flowers, as one would expect in the spring in the Mallee. I was looking forward to a much better display. There was only one flower that was flowering in spectacular proportions, and that was an enormous area of *Brunonia australis*. I came across it on the slopes of Round Hill, quite off the road amongst outcropping rock. It was the most beautiful patch of blue I have seen. *Wahlenbergia consimilis* was fairly widespread but sparsely growing.

The weather was continuing to be so hot, that we left on the 21st October.

Australian Dotterels were mentioned as being found on Tchelery Station south-west of Hay, so we thought we might try to find them. The first place after Round Hill was Mt. Hope, a copper mine. We found a rather derelict hotel, and a smarter store. We chose the store for a drink of pineapple juice which was cold from an overworked refrigerator. Mt. Hope looked a pretty grim place on this day with the wind blowing as if from a furnace, with the area being tree-less and dusty. Perhaps when it is colder in winter, any greenness might compensate for its desolateness. After this cooling interlude, we pressed on to Hillston, 48 miles west.

This stretch of vegetation was mostly Callitris forest; here and there being cleared for grazing; but with no animals in sight. This lack of animals was remarkable, with not even wild ones on all those vast empty plains. Sometimes, cleared parts had a crop planted, but there did not seem much hope of fruition if no rain fell before December. The Hay plain which started at Hillston, was dead flat, with no trees except those away on the horizon lining the Lachlan River, low salt bushes, and helichrysums. Hillston did get some irrigation from the Lachlan, and therefore looked quite green and lush. We stopped by the river to have lunch, watching Sulphur-crested Cockatoos in the Red Gums. The sky had clouded over by now, but it was still very hot, and the wind had become very strong, making it difficult to hear any bird calls.

Booligal was a very lonely township, but we had another cold drink and went on.

We came across Banded Plovers and Australian Pratincoles standing on the road. One plover insisted on staying on the road, and when we stopped to look closer, we saw a baby plover running on the road, too, in a most irresponsible manner. Also Chats flew up in front of the car, from where you could have sworn there was nothing previously. We stopped for a few minutes to look, and found several Crimson Chats in the salt bushes, and a family of wrens without a male. There was also a Horsfield Bush Lark sitting on a twig, singing its heart out for fully five minutes as we approached closer and closer. Further along this plain we came upon road building where the workmen had dammed up water for their purposes, and let it seep into salt bush away from the road on both sides. This seemed to have caused good conditions for waders, for there, to our amazement, we saw Sharptailed Sandpipers in amongst the bushes growing in the water. There were at least 12 of them.

We stayed at Hay for the night, when the wind changed to the west. It was so cold now, we had to rug up whenever we got out of the car.

We headed west from Hay towards Balranald, but turned south half-way, and went towards Moulamein, but did not go near that town. On this lonely open road, there were still no animals to be seen; just dead flat country, daisies and salt bush. Excavated heaps of soil from dams were the only eminences on the horizon. The dams all seemed to be empty of water except one—the Tchelery Station dam, and that did not look as if it would last the summer. There was, of course, not an Australian Dotterel to be seen around here, but we found a marvellous little oasis nearby. For some distance we noticed on the horizon what looked like a line of trees, as if along a river, but it turned out not to be so. It was actually a dry water course, seemingly draining off a paddock which was denuded of vegetation. The wind was removing sand from it quite considerably. However the trees were seized upon by the birds as the only shelter for miles. Numerous Crimson Chats, a few White-fronted Chats, Red-capped Robin, two Masked Wood Swallows building a nest, six Black-faced Wood Swallows, Willy Wagtails, White-winged Trillers, Blue Bonnet Parrots, Budgerigahs, Galahs, Magpies, Australian pipit, Wedgetailed Eagle, a dead Brown Hawk, a dead Raven, two Zebra Finches, Blue and White wrens, Nankeen Kestrel, and a sign of an Emu. The salt bushes were quite big thickets here. The eucalypts were fairly stunted, not a Mallee, but about the same height, not straight growing, and with blackish bark. I was sorry I did not know the species. On the map, this part of the world seems to be full of named "Tanks", but there is nothing there of course, except the empty dam. Windouran Tank actually turned out to be the Station homestead itself, on the road. It was on the Moulamein River, so was irrigated, and looked nice and green with the river Red Gums growing round the house. We came to the river, and thought it looked so pleasant, that we decided to boil our billy. A very pleasant flat bank enabled us to walk quite a way before moving on. Sacred Kingfishers, Galahs, Pardalotes, Starlings, White-faced Herons, Musk Duck, Grey Teal, Maned Geese, Moorhens, Reed Warblers, Little Pied and Large Black Cormorants, Brown Tree creepers, Black-faced Cuckoo Shrike, Eastern Rosellas, and our old friend the White-plumed Honeyeater. There was also a water rat swimming at great speed in the middle of the river, disappearing into reeds; and a large goanna in a tree. A young kookaburra sat on a fallen branch,

and did not fly up, so I slowly went up to it and stroked its head. It did not seem to mind, but of course it could have been trembling inwardly. I have done this with young magpies, too. They have probably just been pushed out of the nest by their parents and are not sure of flying yet.

Our destination was Barmah Forest that night, so we went on, arriving in time to put up our tent before dark, and delighted to find the dilapidated old car ferry was no longer at Barmah; but instead, a most imposing new bridge. The Murray and Broken Rivers were well up over their banks, so we had to be sure our tent was out of reach of any further rising water. It looked lovely over the Moira Lakes, with many White Herons and Egrets flying over the reeds. Very strong wind was still blowing next day, but it was fine with patches of sun. We tried to get along a car track through the forest, upstream, to where I had been before, but the water had come so far in that we could not proceed. What a sight all these beautiful Red Gums made, standing in water.

The second day, the weather became very dull, and by nightfall it started to rain. The third day started fine, but came on to rain again. We went off for a drive to the Goulburn River, but it rained in misty drifts, so that we gave up and went back to our camp, by which time it was raining heavily. We packed up our gear and stayed in the Barmah Motel for the night, fearing the track out of our camp on the river might become soft and slippery by morning.

Among the 31 species of birds we saw, were Noisy Friar Birds, Little Friar Birds, Yellow Rosellas, many White-winged Trillers, White Ibis, Striated Pardalote, Eastern Rosella, White Egret, Red-backed Parrots, Dusky and White-breasted Wood Swallows, Pelicans, Rainbow birds, and again many Crimson Chats, right amongst the trees. A White-faced Heron put herself at a tremendous height on her nest, in a tall thin red gum growing in water. Taking no chances it seemed.

Wahlenbergia consimilis was again the only wild flower about, even growing under water near the banks. Because of the wet conditions we left Barmah a day earlier. As we approached Melbourne in the afternoon, the weather improved of course, but we were told it had been very cold, too, after a warm spell.

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Mating Call as an Aid to the Identification of the Frogs of the Melbourne Area

by M. J. Littlejohn and A. A. Martin*

Littlejohn (1963) described and figured adults of eleven species of frogs then known to occur in the Melbourne area (i.e. within 25 miles of the Melbourne General Post Office) and provided some information about their life histories and distributions. A key to living adults was also included. Martin (1965) described and figured the tadpoles of these species and also provided a key to aid in their diagnosis. Later, another species was added to the list (*Hyla lesueuri*) and the available information about it published, together with a key to the eggs of the twelve species (Martin, Littlejohn and Rawlinson, 1966). One important aspect of frog biology remains to be considered as an aid to diagnosis—mating calls—and the aim of the present account is to provide a key to this character, and thus to complete this series of articles on the natural history of the frogs of the Melbourne area.

The mating call is produced by the male and functions to attract a breeding female of the same species to it. In general, each species of frog has a characteristic and most distinctive mating call, particularly where the species breed in the same places at the same time. Accordingly, this behavioural attribute can be of considerable value in the field identification of frogs.

While it is often difficult and unsatisfactory to provide written descriptions of sounds, we feel that if they are used in conjunction with other biological data, particularly male calling site and breeding season, they will assist in species identifications. The ambient temperature can have a considerable influence on the structure of mating calls. As the temperature falls, the calls usually become longer and more slowly repeated, and the pulse rates ("trilling") slow down. The accompanying key is designed to work over a temperature range of about 45-65°F. and allowance should be made for observations outside these temperatures.

Detailed accounts (including physical analysis) of mating calls of some of the frogs which occur in the Melbourne area are provided in the following references: Littlejohn (1959, 1964)—*Crinia signifera*; Littlejohn and Martin (1964)—*C. victoriana*; Littlejohn (1965a)—*Hyla ewingi* and *H. verreauxi*; Littlejohn and Martin (1965)—*Limnodynastes dorsalis, L. peroni*, and *L. tasmaniensis*. General information on frog calls is provided by Littlejohn (1965b, 1968).

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Key to the Mating Calls of Frogs of the Melbourne Area

1. Call consisting of single, short notes separated by long intervals . . . . . 2.
   Call consisting of a series of rapidly repeated notes . . . . . 4.
2. Calling in still water; late spring—summer . . . . . 3.
   Calling on land; harsh, grating "cre-e-eck"; autumn only: *Pseudophryne bibroni* (Bibron's Toadlet); *Pseudophryne semimarmorata* (Southern Toadlet).

3. Banjo-like "plonk": . . . . . *Limnodynastes dorsalis* (Bull Frog).
Soft, explosive "whuck": . . *Limnodynastes peroni* (Striped Marsh Frog).
Loud, sharp "click" as when two stones or coins are struck together: *Limnodynastes tasmaniensis** (Spotted Marsh Frog).

4. Notes of two distinct kinds . . . . . 5.
Notes all the same . . . . . 6.

5. One to three long, rasping introductory notes followed by a series of short, musical notes; calling on land; autumn only: *Crinia victoriana*** (Smooth Froglet).
Very long, modulated growl followed by a series of grunts; calling in open water; spring—summer: *Hyla aurea* (Green and Golden Frog).

6. Notes in groups separated by long intervals . . . . . 7.
Notes in a continuous sequence, not in groups . . . . . 8.

7. Short, musical trill of about 10-15 very short notes (pulses); heard through most of year, especially after warm, heavy rains; calling floating in open water: *Neobatrachus pictus* (Spadefoot Toad).
Long, harsh call of about 5-12 notes: "wirr-wirr-wirr", etc.; may call on land, in emergent or marginal vegetation or while floating; heard throughout the year: *Hyla ewingi* (Brown Tree Frog).
Long, whistling, musical call of about 15-25 notes; calls on land; spring—summer: *Hyla verreauxi* (Verreaux's Tree Frog).

8. Rapidly and regularly repeated short, grating, pulsed chirps; usually on land at edge of still water; heard through most of the year: *Crinia signifera* (Brown Froglet).
Regularly repeated, soft, fast-pulsed trill; calling on land along shallow, rocky streams; late spring—summer: *Hyla lesueuri* (Rocky River Frog).

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* Southern Call Race of Littlejohn (1966).
** Formerly *C. laevis*, in part; see Littlejohn and Martin (1964).

A Day Tour to Dutson

by Ellen Lyndon

On the last Saturday in September 1968 the Latrobe Valley Field Naturalists Club arranged an excursion to the Dutson area, south-east of Sale, where wildflowers still make a wonderful display each season. Permission was requested to enter the Latrobe Valley Sewage Disposal Farm and this was not only granted but a guide supplied to lead the party to the best Thryptomene and Calytrix areas on the farm. The weather was kind but the mosquitos less so. As the excursionists left the shelter of their cars they were literally "browned off" by the hungry hordes that instantly settled all over their persons. The pleasant scent of leafy bush soon gave way to that of a well-known brand of repellent.

It seemed hard to bypass the plentiful bird life on the sanctuary of the Sale Common and the adjacent morasses, teeming as they were with tall white Egrets and Spoonbills, Pelicans and families of young Swans. The whole of this country is at its natural best this spring with large expanses of weedy shallow water in which the young Red Gum forests appear to be thriving. Some two miles out from the junction of the Dutson Road with the Seaspray Road there is an isolated patch of the small grey *Grevillea lanigera* on the edge of the south table drain. Seedlings are appearing along the drain but one wonders if the plants occur there naturally or accidentally, With increasing settlement the roadsides have lost much of their former interest but here and there the blue of Indigo and Comesperma and later, the creamy whiteness of Wedding Bush brighten the brown Bracken.

Just west of Carr's Lane the richly pink *Boronia anemonifolia*, massed along the road verge under the phone lines in company with the golden brown pea *Bossiaea cinerea*, made a wonderful display. The fence of the newly cleared paddock is new and where the earth has been scraped clean of shrubbery, hundreds of Boronia seedlings are striking freely. On the opposite roadside thick shrubbery of *Banksia serrata* association still persists, sheltering more Boronia and Bossiaea, Aotus, Pimelia, Stackhousia, Hibbertia species and others, with a few common orchids, Glossodia, Caladenia and Pterostylis.

The entrance to Carr's Lane from two directions has left a substantial wooded triangle that has been severely burned, perhaps many times. Bracken is refurnishing the bare earth under Banksia and Peppermint and many flowering shrubs are making a comeback. Leaves of half a dozen species of orchids were noted, including *Lyperanthus nigricans*. New netted fence lines supply shelter and support for many of the flowers mentioned previously and naturalists were able to walk the cleared tracks and see them growing under what amounted to garden conditions. The lane itself harbours a wealth of shrubs that thrive in the clean white sand. One of the Star-hairs, *Astrotricha parvifolia*, grows freely here and others noted were Stypandra, *Kennedya prostrata*, *Platylobium obtusangulum* and *Xanthorrhoea australis* as well as all of those growing on the main road. It was not far from this spot and on the same sand ridge that a former member of the F.N.C.V. established a wonderful garden that he called "Chorizema". Mr. Robinson was a school master, who, on retirement, bought a tract of this poor but floriferous Dutson bushland where the flowers appeared na-

turally. He died in 1943 at the age of 91. The garden still survives in other hands. Amongst a wealth of shrubs and trees both native and exotic there is still a fine collection of showy West Australian Banksias.

The attentions of the mosquitoes moved the party on from here and short stops were made where the water race from the Dutson Springs crosses the road in two places. Coral Fern, *Gleichenia circinnata,* fights a losing battle along the fence line, amid clumps of the feathery Tassel Cord-rush, *Restio tetraphyllus.* Various water plants and sedges and rushes make this fast little stream interesting and where it enters the paddock it gives a distinct impression of flowing uphill. *Bursaria spinosa* grows to tree size here, with rugged bark and few prickles. The Black She-Oak overhanging a bend of the road bore as many galls as it did healthy cones and caused some confusion, as the galls are beautifully formed wooden rosettes. With *Casuarina littoralis* grows the Drooping Sheoak, *C. stricta,* often so symmetrically shaped and rounded in this country that it could well be named the Shapely Sheoak.

The road through the Sewage Farm skirts many swampy depressions that have now become lakes. Nest boxes are provided for breeding ducks and are reported being put to good use. Hundreds of acres of scrubby bush have already gone under the plough but there are still some excellent wildflower areas well worth preserving in their natural state. Throughout the day's tour several wattles brightened the roads and the bush, mainly *A. oxycedrus, A. verticillata* and *A. diffusa.* The small Beard-heaths *L. virgata* and *L. ericoides* misted the thickets of Calytrix and *Thryptomene micrantha*; there was blue of Dampiera; purple cart wheels of Hardenbergia; Showy Bossiaea and another with tiny notched leaves and many spines, *B. microphylla*; Pulteneas and Dillwynnia; Astroloma, the Pine Heath; Red Correa; drifts of the pink-tinged Silky Teatree and the bolder white of Manuka. Racinocarpus, the Wedding Bush. Though we saw none of it this day, one of the finest of the Mint Bushes, *Prostanthera denticulata,* is found occasionally on Dutson Downs. A short visit was paid to the reserve on the road to Golden Beach resort where flowers were colourful amongst the clumps of Hypolaena, the Tassel Rope-rush. Mosquitos too were larger and fiercer hereabouts and as there were no entomologists in the party an early start was made for home, with time in hand for a little bird-watching along the way.

Our own way that weekend lay along the new sealed highway that connects Dutson district with Seaspray township, formerly only a rough sand track along the narrow sand strip between the sea and Lake Reeve. Lush coastal vegetation has healed the road-making scars, making it a drive of uninterrupted peace and beauty, at least in the cooler months. Beach Teatree was in bloom and Swainson's Pea trailed purple colour across the sand. One could wish that this ribbon of woodland could have been spared for the people for all time, instead of falling into the hands of the subdividers as it has. However, given time, and the complete banning of harmful pesticides, it might yet revert to the winged denizens of our fair land. There is evidence that the first inhabitants made frequent use of the area, for the road cuts many old kitchen middens. A local resident told us of a big box tree on "Dutson Downs" with the scar clearly defined where an aboriginal had taken the bark for a canoe—the only such example he had come across in a lifetime of roving the bush thereabouts.

Our Vanishing Geological Monuments

by J. A. Blackburn

In the name of progress many of our geological monuments are being bulldozed out of existence or "improved" beyond recognition by landscaping. Some of this is justified. The Clifton Hill quarries, world famous for Zeolite minerals, and the Brunswick brick pit which produced some remarkable fossils, have been infilled with garbage.

Many other quarries which are a blot on the landscape must suffer the same fate to be redeveloped for public use. However the geological facts disclosed therein should first of all be placed on record. Some years ago the Royal Park railway cutting, which has been the training ground for generations of students of geology, had one face completely covered with foreign material transported from some distance away at considerable expense. The purpose was to eliminate water erosion along the top of the cut. This could have been effected more economically by far less drastic measures.

Some of our natural monuments have had lucky escapes. The famous columnar basalt "Organ Pipes" at Sydenham were saved by government action when their conversion into a road-metal quarry was imminent. Representations made to the M.M.B.W. have resulted in minor modifications in the re-alignment of the Moonee Ponds Creek made necessary by the Tullamarine Freeway project. This will preserve and make more accessible the cliff of fossiliferous Silurian sediments just north of Brunswick Road which is described and illustrated in "The Geology of Melbourne" by G. B. Pritchard (1910) and numerous other scientific papers.

Proposed foreshore development at Point Gellibrand, Williamstown, if carried out, will mean the end of an interesting lava blister, illustrated, but not described in detail in "Physiography of Victoria" (fig. 251) by E. Sherbon Hills. This blister, some 19 feet long and 12 feet wide, was formed by steam pressure when hot, and still plastic lava, flowed over water. The top has been removed by marine erosion so that it is not readily located among the sea-scattered boulders of basalt which make up Point Gellibrand. As no published locality description is known to me I would like to place its precise location on record.

It lies at high tide level, adjacent to a military reserve known as Fort Gellibrand. The south-west side of the military reserve is separated from the Williamstown Cricket Ground by the unmade extension of Twyfold Street. It is bounded on the north-west by Morris Street and on the north-east by Railway Crescent. The seaward boundary is defined by two straight lengths of 8 feet high woven wire fence with the angle well to the west of the centre. This angle post is 436 feet eastward along the fence from the east side of Twyford Street extension. From another post 54¼ feet eastwards from the angle it is 93 feet, in a southerly direction to the centre of the blister and 85 feet northerly back to the angle post. The most convenient means of access is via Railway Terrace to the sea, and thence about 1000 feet westward along a rough car track to the angle post.

The lava blister at Williamstown, referred to in text.

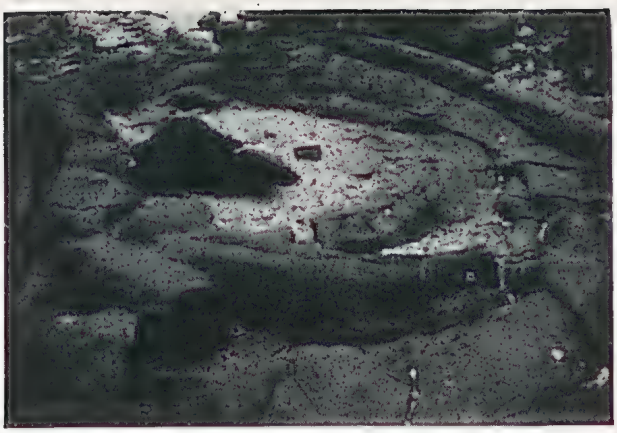

Photo: Author.

Provided that the fence, which is presumed to be on the title boundary, remains, this description is quite adequate. If the fence is removed it will still be possible to re-establish the location of the blister, but only by means of an intricate survey.

Published locality reports may prove to be inadequate for several reasons. The initial description may have been incomplete or misleading (possibly due to the isolation of the area, the absence of suitable landmarks or maps available at that time). Landmarks may be demolished or disappear, names changed or forgotten. Modern earth-moving equipment can completely alter the appearance of an area. Thus many areas of interest, thoroughly investigated in the past, or merely recorded, may be lost for ever. They should be revisited and the locality description brought up to date by measurements from street corners or crown allotment boundaries. This is a task well suited to the enthusiastic amateur. At the same time he can keep his eye open in temporary excavations and place on record factual information of what may eventually prove to be of importance to a professional geologist. Without his effort this information would probably be lost.

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Prostanthera schultzii seen in Flower for the First Time!

by J. H. Willis*

It all began in the middle of 1886 when Rev. W. F. Schwarz of the Hermannsburg Lutheran Mission, Cent. Aust., climbed to the top of Mt. Sonder (4417 ft.), gathered some foliage of an unknown shrub and sent it off to Baron von Mueller in Melbourne. Noticing the strong resemblance to Round-leaved Mint-bush, Mueller wrote on the label *"Prostanthera schulzii"*—a mark of honour to Schwarz's co-worker at Hermannsburg, Pastor Louis Schulze who may even have shared the climb on Mt. Sonder.

Eight years later, in June 1894, Professor Ralph Tate of Adelaide also visited Mt. Sonder while participating in the Horn Scientific Expedition. He collected a better piece of the same shrub, but still without any sign of flowers, and in his botanical report of 1896 he published the following very brief description:

> "Differs from *Prostanthera rotundifolia* R.Br. in smaller, less crenate and thicker leaves—Flowers and fruit remain unknown. Higher slopes of Mt. Sonder."

Tate ascribed the name to F. Mueller, but unfortunately mis-spelled the species epithet as *"schultzii"*—with a "t" before the "z". It so happens that there *was* an M. Schultz who made extensive collections around Darwin in the 1860's, but he had no connection whatever with the L. Schulze of Hermannsburg.

So the matter rested for half a century, and *P. schultzii* continued to be somewhat of a mystery plant. Other botanical visitors to Mt. Sonder certainly saw it from time to time, but failed to find flowers. The only hope seemed to be that of getting the shrub into cultivation somehow. When Alan Morrison and I climbed Mt. Sonder in July 1966 we secured plenty of cutting material. This, alas, had to be carried around with us in plastic bags for a couple of weeks and, by the time it reached Melbourne, was in very poor shape—none of the cuttings struck. A year later, in winter 1967, Misses Laura White and Jean Blackburn of our Club also had the opportunity of getting to Mt. Sonder. Very thoughtfully, they asked were there any botanical items needed from there by the Royal Botanic Gardens. At once we said *"Please"*, try to get more fresh sprigs of *Prostanthera schultzii*, and it is much to the credit of these two co-operative ladies that excellent material reached the Botanic Gardens by air-mail from Alice Springs.

Earlier this year our Gardens propagator was able to announce that several cuttings had struck and were growing well. Then there was exciting speculation: *would* the plants flower, and would the flowers be mauve as in *P. rotundifolia*? Well, they *did* burst into bloom last month, and—wonder of wonders—the flowers were small and white, in very dense little cone-like heads much resembling marjoram, but quite dissimilar to any known mint-bush. In fact, it was immediately obvious that the Mt. Sonder bush was no *Prostanthera* at all—it had only two stamens instead of four! What other genus could it possibly belong to? The most likely one seems to be *Wrixonia*, which is at present known only by a single species, *W. prostantheroides*, from the arid Austin District of Western Australia. The very isolated Mt. Sonder population would constitute a second species of *Wrixonia*, bearing somewhat the same relationship to *W. prostantheroides* as *Prostanthera striatiflora*, say, does to the twiggy *P. spinosa*. It was Mueller who also published *Wrixonia* (1876), thus honouring Sir Henry John Wrixon (1839-1913) who was Solicitor-General for Victoria in 1870 and Attorney-General in 1886. I am ignorant of his claims to botanical immortality, but I suppose that is of no consequence.

* Assistant Govt. Botanist, National Herbarium, Melbourne.

Book Reviews

Australian Spiders

by J. Child

(Published by Cheshire-Lansdowne in the Periwinkle series)

Lightweight cardboard cover, approx. 5" x 7¼". 99 pages with 15 of colour plates, 19 half-tone plates, and 35 in-text line drawings. Price $1.25.

As with the other titles in this series, this revised edition has been enlarged with the assistance of many good colour photographs. These do help with the general identification of specimens for which this book is intended. The text is clearly written and gives a good introduction to this topic. The level of difficulty is such that the beginner can understand the terms and classifications without being misled by scientific inaccuracies. This does happen in many books where the author attempts to simplify the text into layman's terms. There is, however, one point where Mr. Child could bring the classification of the Arthropods up to date. The class Myriapoda has now been divided into two classes—the Diplopoda (millipedes) and the Chilopoda (centipedes).

It is the photographs and the illustrations especially which assist in making this book most useful for the quick identification of this group of arachnids.

Neil W. Morley,
Education Officer.

Australian Insects

by J. Child

(Published by Cheshire-Lansdowne in the Periwinkle series)

Lightweight cardboard cover, approx. 5" x 7¼". 109 pages with 16 of colour plates, 20 half-tone plates, and many in-text drawings. Price $1.25.

The new edition of this book has been made most presentable by the excellent colour photographs. These enhance the text which still gives a good general coverage for the non-expert in entomology. The introduction is good and easily read while the brief descriptions of each order and typical species provide sufficient information for this level of study. Mr. Child does manage to keep the organization of the book at a fairly general level without the loss of scientific accuracy. These good points more than balance out many annoying errors or omissions in the lay-out of the book.

Such things as incorrect keys (page 54), family headings on the bottom of a previous page (page 39), photographs of species not described, e.g. Bush cockroach and lack of cross-referencing do detract from an otherwise useful book for the study and identification of this important group of animals.

Neil W. Morley,
Education Officer.

Some Fossil Bird Tracks

by K. N. Bell and J. A. DeMerlo

This is a note to describe a set of six imprints believed to be fossil bird tracks.

1. *Imprints*

The imprints were discovered by Mr. V. J. A. DeMerlo, one mile south of Hamilton's Creek, Tarwin Lower (see map).

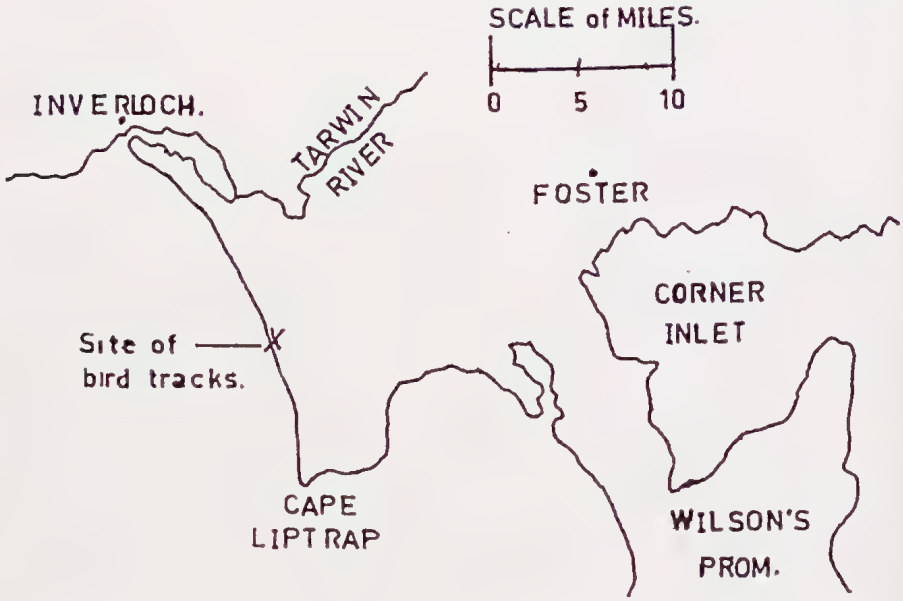
The tracks are on a block of aeolianite (consolidated dune limestone) and are shown in Plates 1 and 2. Five of the tracks are in a good state of preservation but one is badly weathered. They are 5 inches long (from rear toemark to front toemark), with 6 inches between each pair, and average 10 inches between each set. The imprints are approximately ¼ inch deep, but some of this depth may be due to selective erosion since the block of aeolianite was exposed.

The type of bird which left these marks is not known. By the nature of the tracks, a hopping bird with a prominent rear claw is indicated. As there is no indication of any webbing between the toemarks, a sea bird would seem to be excluded.

2. *Age of the Tracks*

The age of the tracks can only be estimated roughly. Aeolianite deposits are very common around the coastline of Victoria, for example, The Bluff at Barwon Heads, the coastline from Warrnambool to Portland, and the Nepean Peninsula. These are all considered to be of much the same age —namely Upper Pleistocene.

The original dunes are thought to have formed when the sea level was much the same as at present (Boutakoff, 1963). Up to five soil horizons



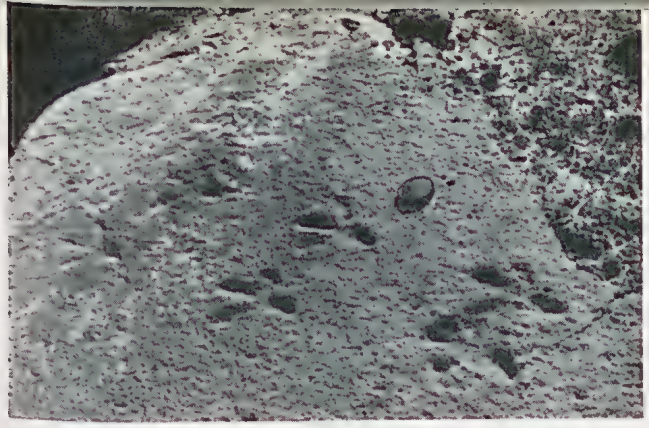


Plate 1

Set of Bird Tracks in Aeolianite. (Note—Lens cover is 2 in. diamater.)

photo: K. N. Bell.

are known in the aeolianite deposits indicating a long time interval between the formation of the first dune and the last dune with its associated soil horizon. As it is not possible at present to state from which dune formation the aeolianite containing the bird tracks came, the age must be left within the wide limits of the Upper Pleistocene—about 150,000 years to 30,000 years ago.

3. *Other Fossils in the Aeolianite*

Other imprints have been found in the aeolianite deposits of Warrnambool, for example, those of Mr. E. D. Gill, as reported in the *Herald*, January 1st, 1968.

Vertebrates have also been found in the aeolianite. Gregory (1902) and Gill (1954) have both described bones of giant extinct kangaroos found in the deposits on the Nepean Peninsula.

It is therefore likely that many imprints and other remains are still to be found and anyone visiting the seashore where these aeolianites occur could make an interesting contribution to the rather poor knowledge of Late Pleistocene—Early Recent life in Victoria.

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Plate 2

Close-up view of Centre Pair of Tracks.

photo: K. N. Bell

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Brown-headed and Tawny-crowned Honeyeaters

Mr. Victor Jacobs again sends some observations from Narre Warren.

At Longmeadow the autumn flush of flowers on the Grevilleas has brought the Brown-headed Honeyeaters back again, and they were observed in the mini wood insect hunting. There are some quite young birds in the flock, and it was possible to approach them closely.

In mid February this year a different slim, medium-sized honeyeater perched on next door's power wire. By the time I had collected the binoculars it had disappeared and I returned to the typewriter. A few moments later Simone called, "Your bird is back!" and I went to the kitchen window in time to see it land on our wire a mere four yards distant. Brown back, yellow-orange crown, vivid white underparts, a black line through the eye that followed the neck line down to the chest to appear like a doctor's stethoscope, and a white spot within the black line at the rear of the eye. It was not difficult to find in the books — the Tawny-crowned Honeyeater—but rather unexpected as the last one that I saw was at Pink Lakes north of Linga. According to Wheeler's *Handlist of the Birds of Victoria* it has a distribution which includes the coastal margin. Has anyone else seen it in this vicinity? If the first visit was accidental the visits on the following two days were quite purposeful, for it spent minutes at a time feeding from the orange bells of a succulent which I think is *Cotyledon orbiculata.*

Toads and Termites

Mr. A. G. Fellows recalls this incident which occurred on his property in Charters Towers, Queensland.

While high up a ladder doing needed roof repairs, I looked down to see an unusual sight not far from the ladder's base.

Being late evening and heavily overcast, following a recent rain, the dim light showed five objects in a ring that had not been there when I ascended the ladder.

Finishing the job on hand rather hurriedly, I descended to investigate, and when three feet from the five objects, they were recognized as large toads. My eyes were used to the half-gloom by now, and I was surprised to see all the creatures facing the centre of the ring. As I watched—and by now I was two feet from the toads, squatting there myself—I saw a strange occurrence repeated at intervals of a few seconds.

A toad would quickly "bow" or "curtsy" to the others, recovering its natural posture just as quickly. A pause —then another did the same thing, and so on. This required investigation; and now that the daylight was practically gone, a hurried departure on my part to obtain a flash-light was the order of the night. Thus armed, a return to the spot showed a continuance of the ceremony, plus an explanation of the toads' presence. A tiny straw-sized opening in the earth showed the hurried appearance of female termites, one at a time—a pause to spread the wings—a "bow" from a toad (never two toads at once incidentally)—a lightning flash of a tongue—a withdrawal of same—and one less *alate* to set forth as a potential queen. For once I gave full marks to the toad population in doing such a useful job as that.

I still wonder, however, why no disputes occurred over the termite meal. The quick "bow" and tongue-flash were extremely rapid, and the distance of each toad from the escape-pipe of the termites was uniform, as was their spacing around the hole.

This incidentally, reinstated for me the toads' status somewhat; having accidentally stood bare-footed on one some time previously in the dark. The same toads then received many names other than *Bufo marinus!*

Archidoris kerguelenensis Bergh, the First Record of a Nudibranch from Macquarie Island

by WILLIAM MERILEES* and ROBERT BURN†

The Australian Government has maintained a base at Macquarie Island (54°30′S., 159°00′E.) since 1948. During this time there has been no extensive survey of the subtidal molluscan fauna. Powell (1955, 1957) has examined, described and brought up to date the molluscan material collected by previous expeditions, and Dell (1964) has published an account of the collections deposited in the National Museum of Victoria by members of the Australian National Antarctic Research Expedition since 1948. Visiting oceanographic vessels, notably the USS Glacier and the USNS Eltanin, have taken small samples at the Island during their brief visits but the results of these collections have not yet appeared.

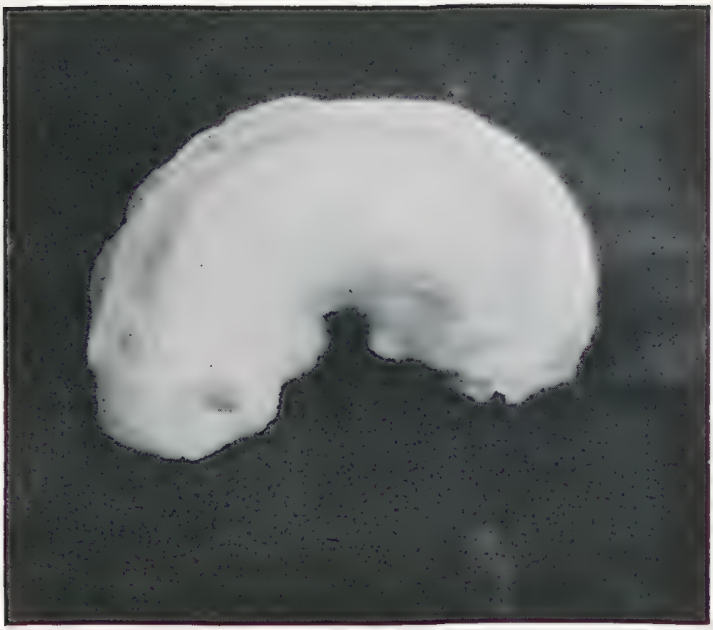
On 16 June, 1967, while examining rocky tide pools in conjunction with studies being conducted on the feeding ecology of the Dominican Gull (*Larus dominicanus*), the senior author collected a large dorid nudibranch in a pool just north of Garden Cove on the north-east side of the Island. Subsequently the specimen has been examined by the junior author, who has identified it as *Archidoris kerguelenensis* Bergh (1884), a species originally found at the Kerguelen Islands and more recently at Heard Island (Burn, ms.). This is the first record of a nudibranch from Macquarie Island and brings the total number of molluscan species recorded to 43 (Dell, 1964: 300).

* A.N.A.R.E. Biologist 1967-8.
† Hon. Associate in Conchology, National Museum of Victoria.

Briefly the specimen may be described as follows. Medium sized dorid, broadly oval in shape, 28 mm. long and 16 mm. broad, plump, with thick tuberculate notum and wide hyponotum, wholly light yellow in life. Branchiae nine in number, bipinnate and crowded posteriorly. Head with tumid angular oral tentacles. Radula with simple hamate teeth, the formula 22 x 29.0.29. Male copulatory organ small and conical.

The original specimen trawled by the "Challenger" from 25 fathoms off Royal Sound, Kerguelen Islands, was 45 mm. long and 18 mm. broad with a narrow thick hyponotum. Heard Island specimens comprise both forms, that is broadly oval with wide hyponotum and elongate oval with narrow hyponotum. The radula of the original specimen had 27 rows of 40.0.40 teeth, in the largest and smallest Heard Island specimens the counts are 24 x 36.0.36 and 22 x 30.0.30; in each case the shape of the teeth is consistent with the present specimen. The small conical male copulatory organ is consistant throughout the original, Heard Island and present specimens.

This specimen does not differ in any major characters from the original description or Heard Island specimens, hence it must be identified as *Archidoris kerguelenensis* Bergh (1884). This, and a second specimen taken at the same locality on 24 March, 1968, by Miss Isobel Bennett, will be described in detail in a paper by the junior author.



Archidoris kerguelenensis Bergh, from Macquarie Island.

The addition of this species to the Macquarie fauna strengthens Powell's claim that Macquarie Island has much in common with Kerguelen and Heard Islands which he united in his con cept of Faunal Provinces under the name of Kerguelenian. Dell remarks that this concept loses sight of the high degree of endemism and diverse origins which set Macquarie quite apart from the other two Islands in this province; but until a much more extensive survey at Macquarie Island is completed, the zoogeographical picture will remain fragmentaary.

Acknowledgement

We are indebted to the Antarctic Division, Department of Supply, Melbourne, for the black and white print used in this paper and for permission to publish this account.

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* * * *

Correction

In the *Victorian Naturalist* for last month (**86**, 4—pp. 98 and 99) the credit for the two photographs should have read W. Tothill; not Author as printed.

Country Club News

Benalla F.N.C.

Seventh Annual Report,
November, 1968

Extension. Best news for us in 1968 has been the formation of the Upper North-Eastern Field Naturalists' Club under the leadership of Mr. Goode. We have been represented at their first meetings and excursions, and wish them every success.

Exhibitions. This year we exhibited at the Benalla Technical School Hobbies Day, where Junior member Bill Osborne's lizards were a centre of attraction. The Club exhibitions of native flowering plants at the Benalla Agricultural Show, and the Benalla Rose show brought much admiration and many queries were put to our able botanist and President, Mrs. G. D. Brooke.

Meetings. The average attendance at meetings this year showed a slight gain, to be 25 members. The Juniors, under Vice-President Mr. Harrison, continue to play an active part in our Club, and their keenness is reflected in attendance, and the special lines of study they are following.

Conservation. The Club has formed a Conservation Committee. Many areas near Benalla require survey work to be done, so the case for their conservation may be put. Our native shrubs at the Say Memorial are doing well, and we have offered our services to the City to help in planting a proposed River Walk.

Guest Speakers. We are grateful to these learned gentlemen—

Mr. P. Lawson—Several subjects before he left to continue study in the U.S.A.

Mr. R. Birchill—Exotic species.

Mr. E. Goode—Observation and memory.

Mr. I. Harris—Spiders.

Mr. N. Wakefield—Cave excavations.

Excursions. An Ibis Rookery at Goomalibee.

The Reef Hills for wild-flowers.

Tatong for wild-flowers. birds and animals.

With the Upper N.E. Naturalists to several locations...

We hope to arrange more excursions in 1969.

Exhibits at meetings have ranged from a bandicoot eating grasshoppers to carpet snakes and feather-tailed gliders. More specimens of the squirrel glider have been discovered.

Membership. We have gained some valuable new members, but we are losing our Treasurer, Mr. Jack Cumming, and his wife, Alma—Librarian P.R.O., and their children, Anne, Graham and Robert. They leave us for Khancoban. We are grateful for the hard and willing work they have done for the Club over a period of years, and will miss their cheerful personalities at our meetings. Our friendship will persist, and we hope they can visit us.

R. R. Barber, Secretary.

Western Victoria Field Naturalist Clubs Association

Report of Activities of individual Clubs for year 1968

(Compiled by J. Lineker, Hon. Secretary, Portland F.N.C.)

ARARAT FIELD NATURALISTS CLUB

President, Rev. C. Burtt. Membership 20 *Meets First Monday, C. of E. Hall*

During the year the Club exhibited a box of wildflowers from the Ararat district at the Barrier Field Naturalists' Show at Broken Hill and at the Nature Show at Melbourne Town Hall.

Members have given talks with slide illustrations at the Warrak Road Prison.

Club members participated in a day's outing with 94 children from the Forest Hills School area, conducting them on a Nature Trail in McDonald Park. A visiting member of Ballarat Club—Mrs. Strange—gave an entertaining slide night.

Members have attended meetings at Mildura, Wyperfeld and the Annual Meeting of the Association at Hamilton.

Sec., Miss Z. Banfield, 7 Ligar St., Ararat.

CRESWICK FIELD NATURALISTS CLUB

President, Mr. E. Stewart. Membership 18 *Meets Third Thursday, Wesley Hall*

Meetings were well attended throughout the year. Guest speakers—Mr. A. Chapman, Geelong, whose movie films included the life cycle of the Wanderer butterfly; Mr. J. H. Willis, an illustrated address, "A Botany Trip of Victoria"; Mr. J. Ryan, of the Sirex team, who told of his experiences of this wasp; Mr. A. Sonsee, who presented the story of the Eyesight of Birds. Two members' nights proved very interesting with some fine papers prepared and presented. Two special nights were held and wer wll patronisd by the public.

Excursions included a survey of fauna and flora in a local forest area; this is to be continued with many regular trips this year.

The effect of control burning was investigated by a visit to the Wombat Forest, and another highlight was the visit to Mt. Beckwith, where a great profusion of wildflowers was found.

Sec., H.L. Barclay, Raglan St., Creswick.

DONALD HISTORY AND NATURAL HISTORY GROUP

President, Mr. R. P. Falla. *Meets First Friday at State School Centre*

Guest speakers for this year have included Mr. Ian Searle, "Cloud Seeding"; Mr. Ian May, an officer of the Fisheries and Wildlife Department; Mr. Keith McRae, St. Arnaud officer of the Forests Commission; Mr. Aldo Massola, "Australian Aborigines, with particular reference to the tribes of the Donald district".

Excursions were made to the Grampians and Mt. Cole area in the company of members of Stawell Field Naturalists Club, and to the Wedderburn Goldfields district, under the leadership of Mr. Ian Maroske, Head Master of Wedderburn High School.

A Natural History Exhibition in aid of the Donald Scout Troop, designed to promote the interest of young people in their native plants and animals was held in October. This suggestion and a future project to have Mt. Jeffcott area fenced and proclaimed a National Reserve, were the ideas o four late highly respected member, Mr. Jim Barrance, and we hope to carry out his plans in the future.

Our Club has been well represented at Mildura and Wyperfeld National Park and Hamilton meetings of the Association.

Sec., John Hollis, Corack East, 3477.

GEELONG FIELD NATURALISTS CLUB

President, . Membership 391 *Meets First Tuesday*

This year has been one of gratifying enthusiasm amoung members, with well-attended monthly excursions and meetings and an increase of membership by 20. The "Geelong Naturalist" has now a mailing list of 379.

Two weekend trips have been included during the year, and three Sunday excursions by chartered buses had upward of 100 members attending.

Another very successful tree planting was held, in conjunction with the Bird Observers' Club, at the You Yangs.

Conservation projects were actively supported by the Club and several are on the programme for the coming year.

Sec., Gordon McCarthy, 26 Fairbrae Av., Belmont.

Hamilton Field Naturalists Club

President, Mr. Murray Gunn. Membership 30 adults, 7 juniors

Meets Third Thursday at State School

Trips were made during the year to survey remaining areas of Crown Land in southern Victoria Range, Sierra Range and the County of Follet.

A start was made on mapping fossil beds in the Grange Burn. Individual members' projects included detailed study of Mt. Napier (Mr. Elmore), Flora lists of the Victoria Range (Mrs. Corrick), Bird banding (Mr. Gunn).

Guest speakers were exchanged with Horsham and Portland Clubs, and our Club President has addressed pupils at a number of schools during the year. Members have attended all WVFNCA meetings, and Hamilton was host club for the Annual Meeting in October.

Sec., John James, 2 McDonald Av., Hamilton, 3300.

Horsham Field Naturalists Club

President, Mr. Con. Kroker. *Meets Fourth Thursday*

The usual Club activities this year have been highlighted by three important projects—

1. Golton Gorge, Grampians. The request for valuable land here for a commercial arboretum was strongly opposed by the Club, and after several excursions was finalised by the Wimmera Shire Council who refused to permit any development of the area.

2. Lower Glenelg and Little Desert proposed National Parks. Protest letters at the area suggested by the Government were duplicated and distributed throughout the district to interested persons. These were then sent to the Minister for Lands.

3. Kiata Sanctuary. The Club took an active part in collecting money and foods for the mallee fowls and other native birds when an appeal was made for assistance due to drought conditions.

The Club has had a cleaning-up session at the John Smith Memorial Sanctuary, and a public appeal was held for money towards the fencing of the 20 acres.

Guest speakers provided a variety of worthwhile programmes. These included Miss Ina Watson, illustrated talk on Birds; Miss Jean Lineker, slides and talk about the proposed Lower Glenelg National Park; Lyle Murphy, an underwater photographer, slides of the Barrier Reef; Mr. Luff, Lecturer at Longerenong Agricultural College, Microbiology; Mr. Roy Cooper, slides of water birds seen on his overeas tour.

Club members have attended Association meetings at Mildura, Wypefeld and Hamilton.

Sec., Miss S. Robertson, 24 Albert St. Horsham, 3400.

Mid-Murray Field Naturalists Trust

President, Mr. B. Curtis. Membership 34 adults, 13 juniors *Meets Third Friday*

Regular monthly excursions included a Camp Out at Wathe Fauna Reserve, and several to the last large area of virgin mallee in the Eastern Mallee, which contains many mallee fowls and rare plants. This is private land, but many difficulties are in the way for it to become a Flora and Fauna Reserve.

Regular monthly Executive and General Meetings have been held, with guest speakers, movie films and nature observations.

Interesting and exciting finds have been varieties of spider, greenhood and sun orchids, found in a small area at Wood Wood; these are new to the area. Also, the discovery was made of three groups of Mallee Bottlebrush bushes in the district. Some are 20 ft. high and very, very old. (These are thought to be a rarity, and the Club would be interested to know the mallee location of any others of these bushes.)

Projects include: 1—Flame Robin Survey with several sightings near river.

2—Check-list of all birds seen in Swan Hill Shire; 3—Butterfly banders actively at work; 4—Setting up of a local Natural History exhibit in the schoolroom at the Swan Hill Folk Museum; and 5—the making of a Herbarium of local plant life.

This year has also seen the publication of our Magazine, "The Mid Murray Field Naturalist". Sec., Miss G. Willoughby, Nyah West, 3595.

MARYBOROUGH FIELD NATURALISTS CLUB

President, Rev. E. Deutscher. Membership 42 seniors, 13 juniors

Meets First Monday at High School

Good attendance has been noted, with an average of 23 members, at all meetings, with interest well maintained in all activities and monthly excursions. The News Letter continues to be presented twice yearly, and efforts to attract and interest junior members have resulted in an increased membership.

Special activities have included planting a native garden at State School 2828, primarily to interest the children in native flora. In an endeavour to preserve a "Green Belt" around Maryborough, further study of local areas has been carried out.

First Camp Out was conducted in October in the Pyrenees Ranges.

In conservation efforts for flora and fauna, protests were lodged with Fisheries and Wildlife Department against shooting of kangaroos in the Newstead district; to the Premier of Victoria and Minister for Lands concerning reduction in area of proposed Lower Glenelg National Park; and to the Minister for Electrical Undertakings concerning the destruction of trees in this area by the S.E.C.

Two birds new to the district have been reported—the Pink Robin and Spiny-cheeked Honeyeater. For the first time in 60 years Crimson Chats have appeared, and 12 nests were found.

Sec., Mrs. M. L. Courtney, Carrick St., Maryborough.

PORTLAND FIELD NATURALISTS CLUB

President, Miss I. Watson. Membership 45 adults, 5 juniors

Meets Second Friday at Town Hall

Meetings: The short (5-minute talks by a Club member on a specific subject have remained popular this year.

There has been a speaker each night, three from Club members and eight by visiting speakers. These latter were—Miss H. Aston (Melb.), "Bird Watching in Thailand"; Mr. and Mrs. Corrick (Hamilton), "The Victoria Range"; Mr. C. Kroker (Horsham), "Natural History through a Camera"; Mr. G. Beaton (Colac), "Fungi"; Mr. K. Morrison (Heywood), "Local Eucalpyts"; Mr. P. Sawyer (Portland), "The Abalone Industry"; Mr. P. Roache (S.A.), "Frogs"; Mr. N. Wakefield (Melb.), "Cave Deposits".

There was a film night provided by the State Film Centre.

Co-operation with public: The Club acted as hosts for members of a party of the Commonwealth Study Group for the whole of one Sunday they had in the area.

Members helped with tours by people from surrounding districts, of the proposed Glenelg National Park, and actively supported the Western Victorian Conservation Committee in its campaign. It helped make a relief map of the Park, which was the centre of the display directed towards the Case for the Park, which was staged at the Trade Fair in conjunction with the local Camera Club.

General: A Newsletter has been produced each month.

The Club acted as leaders for the visit of members of the National Parks Association in August. Sec., C. Kaer, 3 Shevill Court, Portland, 3305.

STAWELL FIELD NATURALISTS CLUB

President, Mr. I. R. McCann. Membership 26 adults, 7 juniors

Meets Fourth Monday, Technical School

Visiting and local speakers provided interesting subjects at meetings and outings of one full day an done half day each month included Cave of Serpents, Mt. William; Roses Gap and McKenzie Falls; Mt. Zero; Mt. Abrupt and Mt. Sturgeon; Granite quarry in Black Ranges and Barbican Rocks; Rheola and Melville Caves; and Tree Fern Waterfalls and Mt. Cole Forest.

A series of working bees have cleaned up and fenced the Sanctuary in Crow-

lands Road. Slide nights are again being held at Halls Gap over Christmas to finance the fencing of the 3-Jacks Sanctuary.

The F.N.C.V. trip to the Grampians included visits to Stawell and surrounding area.

The Club members have attended all Association meetings this year at Mildura, Wyperfeld National Park and Hamilton.

Sec., Neil Bennett, P.O. Box 10, Stawell, 3380.

Sunraysia Naturalists' Research Trust

President, Mr. J. Hobbs.

1968 has been yet another exciting year. Research projects, notably studies undertaken by individual members relative to reptiles, spiders, Wanderer Butterflies, etc., have continued thoughout the year and, judging by the reports furnished by these workers from meeting to meeting, steady progress is being made in all of these fields.

The Botany Group (with which is incorporated what was at one time the Group for Growing Australian Plants) has pressed on with unababated enthusiasm. In addition to field excursions and to the publication of much valuable material relative to our local flora, several new plants have been added to both our District and to the State List. The Group has also co-operated (and is still co-operating) with Mildura City Council in certain of Council's Parks and Gardens planning.

Our Nature Photography Group continues to do sterling work, and thanks to its efforts, sufficient money was raised during the year to enable the Trust to purchase its own 35 mm Colour-slide Projector.

It has also been a successful year where birds are concerned. Our ornithologists —notably our President, Mr. J. Hobbs—have once again added new birds to the Sunraysia List; a remarkable achievement when one considers the tremendous amount of ornithological work that has been done in this district over the past 50 or 60 years.

Thanks to the efforts of our Programmes Secretary, regular field outings have been held during the year, and Guest Speakers at our General Meetings have all been outstanding prsonalities in their respective fields.

On the more serious side, our Trust's Board of Management has, as usual, done a fine job; its efforts in the matter of conservation have not gone unrecognized and its cordial relations with Government Departments, Municipal Bodies and the like, have been consistently maintained.

Sec., H. F. Thomas, Box 763, Mildura, 3500.

Warrnambool Field Naturalists Club

President, Mr. W. Alford. Membership 53 seniors, 13 juniors

Meets Fourth Wednesday, C.W.A. Rooms, Kepler

Activities: Guest and member talks, specimen identification, bird, bat, echidna and butterfly banding. Field outings with promotion of knowledge and protection of flora and fauna and habitat wherever possible.

Guest Speakers—Miss B. Dale, Town and Country Planning Board; Miss I. Watson, Association and Portland President; Mr. Neil Douglas, Artist; Mr. John Landy, Naturalist; and Mr. and Mrs. Malcolm Bray, Yirrkala Mission.

This year saw the introduction of the Club Newsletter and its exchange with other Clubs.

The main project was a survey of the flora and fauna in the Sherbrooke River Pine Plantation with the object of having this area included in the Port Campbell National Park when the Forest Commission reliquishes control in 1973. Club members have attended meetings at Mildura, Wyperfeld and Hamilton.

Sec., Mrs. N. Alford, Grassmere, 3279.

Wimmera Field Naturalists Club

President, Rev. C. Mannering.

Although a small Club, regular monthly meetings have been held with slides or films, presented by a number of Guest Speakers.

Excursions have been organized throughout the year, and one of the most successful was to the Crater area of the Little Desert, which is to be proclaimed a Reserve.

Sec., Miss Alison Jordan, "Lister Vale", Kiata.

Excursion Secretary's Report

There was a full programme of excursions during 1968, and once again we are indebted to those who helped, particularly to the country clubs for their hospitality and assistance. There was an Easter excursion to Bright which included a trip to Mt. Hotham, a week at the Grampians in early spring, where the day excursions were led by members of the Stawell, Ararat and Horsham F.N. Clubs. In addition to the wildflowers members were very interested in aboriginal paintings, and botanists were intrigued with a clump of rare Skeleton Fork-fern (*Psilotum nudum*).

A week-end visit to Wytchitella Forest was led Mr. I. O. Maroske, and local residents who are anxious to reserve this interesting area where Mallee fowl can still be found.

The Boxing Day-New Year's Day excursion was centred on Traralgon and day tours made to Mt. Baw Baw, Bulga Park, Tarra Valley, Golden Beach, and Walhalla. These were led by members of the Latrobe Valley F.N. Club, and members were impressed by the areas it is hoped to reserve. Two plants seen by many for the first time were the Elbow Orchid (*Spiculaea huntiana*) and *Sowerbaea juncea*, although geologists preferred the fossil plants remains near Narracan.

Day excursions were varied, and included Phillip Island, Anglesea, Mornington Peninsula, Lerderderg Gorge, Kinglake, Riddell, Dandenong Ranges, and Healesville.

General Meeting—14 April, 1969

The Herbarium Lecture-hall was full with members and friends, and the President, Mr. E. R. Allan, was in the chair.

He announced that Mr. R. W. McKellar was in hospital, and that the good wishes of the members for his recovery would be sent.

Seven new members whose names appear in the April *Naturalist* were elected. Mr. R. W. Bond was elected as an honorary member on the motion of Mr. Garnet and Mr. Morrison.

The Secretary read a letter from Mrs. N. North drawing attention to the excellent help by Mr. D. McInnes in beginning the Montmorency Junior Naturalist Club and bringing miscroscopes and equipment for the meeting. One hundred juniors and thirty adults attended. Mr. McInnes was thanked with acclamation.

A letter from Mrs. J. Law, of the Anglesea and Airey's Inlet Conservation Society announced a meeting in the Anglesea Hall on 27 April to discuss the preservation of the natural environment.

The Secretary announced that Dr. Norman Tindale, to whom the 1968 Field Naturalist Medallion has been awarded, will be present at the May meeting when the medallion will be presented. He will lecture on the 700 or so authentic aboriginal tribes, once in Australia.

Forms for new nominations (to be in by 30 June) for the 1969 award were available. These show the current nominees.

The Secretary also announced that the Native Fauna Conservation Society lecture in the Herbarium Hall on 28 May will be given by Mr. Claude Austin on Odd Pictures and Odd Places in Victoria.

He also announced that the Nature Walkabout pictures by Vincent Serventy would be shown at Hawthorn Town Hall from May 12-16 at 8 p.m. and 1.45 p.m.

The Council's suggestion to the Bird Observers' Club that they might stage the central exhibit at the September Nature Show has been agreed to.

The subject for the evening was "Highways and Byways Adelaide to Broome" by Mr. J. Ros Garnet.

Mr. and Mrs. Garnet travelled for two months over 11,000 miles by rail and car. Maps illustrated the route taken. In South Australia they visited the Sir John Cleland Flora and Fauna Reserve with Mr. Bill Gasking in charge. They went to Telowie Gorge and Alligator Gorge National Park, and to Port Lincoln, seeing along the way a Lowan pecking on the road. They travelled through Coffins Bay and Kellidie Bay National Park, where orchids and Templetonia were abundant, and then past Streaky Bay and Ceduna, to the Nullarbor, showing a crop of spear grass and many wattles. On the road were hairy-nosed wombats killed by night traffic. At Eucla there is a desalination plant and a grand new motel. After going through Norseman to the ghost town,

Coolgardie, and to Kalgoorlie and Kanowna, which has one sign and two inhabitants, a shattered wind screen sent them to Perth.

The route from Perth to the north revealed a wealth of unique native plants through Geraldton to Kalvarri National Park—the largest in the state. There are proposals for taking in more area along the rivers. A Ross Graham Park commemorates a keen teacher in that area.

Beautiful colour slides showed the grandeur of red sandstone cliffs and pools, and flowers from Carnarvon; the Gascoyne River; the Kennedy Range and Mooka Springs. Passing through Exmouth and the Cape Range National Park (and on to the River Ashburton and Onslow and inland from Roebourne to the Millstream Fauna Reserve and the magnificent Wittenoom Gorge and Dale's Gorge), they crossed plains and fields of wild flowers to Port Hedland; and thence 400 miles to Broome and Roebuck Bay, passing Palm Springs. Returning from Broome, they went inland to Marble Bar and back through Mundiwindi, Meekatharra, Cue, and past a beautiful lake to Mt. Magnet. The last part of the journey went south to Esperance and Albany.

We look forward to a separate article by Mr. Garnet on the details of this wonderful journey. Magnificent colour slides were projected by Mrs. Garnet. The President thanked Mr. Garnet for the most interesting talk, and this was supported by enthusiastic acclamation.

Exhibits

Mr. Garnet—Jasperite (Marble Bar), Corals (Point Murat-Exmouth Peninsula), ornamental river tumbled stones (Wittenoom Gorge), Chalcedony (Gascoyne River), Blue asbestos crocodilite (Wittenoom Gorge), Laminated stone (from river bed of Wittenoom Gorge), Greenstone showing flecks of gold (mine shaft near Mt. Magnet), Permian limestone and Brecciated Permian limestone (Cape Range, National Park, Exmouth Peninsula), fragment of Mookaite (Mooka), tuberculated surface rock, probably magnesite (Agnew), Mookaite chalcedony (from Mooka Springs, Kennedy Range), Fruits of woody pear (*Xylomelum angustifolium*), Watheroo, W.A., Fibre balls (Arne Bay, S.A.), Cowries (Onslow), Marine Shells and Sponges (Pt. Murat, North-west Cape, Exmouth Peninsula), *Hakea platysperma*—largest Hakea cone (near Southern Cross), pressed specimen of *Sesbania grandiflora*, Calytrix, Teuchiniums, Hibsicus and *Erythrina vespertilio.*

Mr. E. R. Allan—Coral from Cervantes, W.A., growing under a ledge from the roof of a cave at a depth of 14 ft. under water.

Mr. K. Trotter—A collection of tektites—Australites (believed originating on the moon) and microscope slides of fine sand of Port Phillip Bay.

Miss V. Balaam — Big seeds of Buphane lily (germinating) from South Africa.

Mr. I. Morrison — Platysace heterophylla.

Mr. A. J. Swaby—1. Enormous hanging nests of a fierce, venomous, introduced wasp. These nests are like honeycomb and are enclosed in masticated wood. These wasps are increasing in eastern suburbs.

2. *Avicennio marina* (White Mangrove), young plant in the seed is green and sturdy, ready to root at once in the mud when dropped.

3. *Crinum flaccidum* (Murray "lily") seed germinating. A trunk from the seed bends over to enter the soil and form the bulb. On the "trunk" the stem will grow (Murray flats, Vic., S.A., N.S.W. Family Amaryllidaceae).

4. *Calostemma luteum* (Yellow garland "lily") seed germinating. The trunk has entered the soil and the first leaf seen (Flinders Range, S.A. Family Amaryllidaceae)

A report that cattle egrets had been seen along the Yarra was given by another member.

A relief map, contoured to scale, was shown and explained by Dr. M. Wanliss. This was made by the Western Victorian Conservation Committee. A red colour showed the Government plan to develop some for farms in the Little Desert, and the blue colour outlined the conservationists' idea.

Miss Jenny Forse of the Hawthorn Junior F.N.C. spoke at some length from her well-prepared notes devoted to the current topic of the Little Desert development project. The meeting agreed to a motion put by Barry Cooper, that Council consider the matter, and approach the Government Departments concerned, in order that a revision of the project might be made to abandon the development.

Botany Group

13 March, 1969

Eighteen members and friends were present with Mr. Fairhall in the chair. The speaker for the evening was Mr. Bruce Fuhrer, whose subject was "The Wildflowers of the Grampians", illustrated with quite outstanding slides. Mr. Fuhrer said that Mr. Cliff Beauglehole was making a plant census of the Grampians, revising early work and re-establishing the existence of a number of species, formerly thought erroneously recorded; e.g. *Juncus ingens,* the largest in the world, and described by Wakefield as reaching 15 feet in E. Gippsland. Also *Lycopodium carolinianum* has now been recorded from the Grampians. This is also found in Gippsland. *Leptospermum nitidum* is another plant occurring both in the Grampians and Gippsland. Only a short time ago *Leucopogon neurophllum* which is endemic to the Grampians was known only from Mt. William, but now it is found on the Mitchell plateau and abundant and making almost a pure stand on Victoria Range.

Mr. Fuhrer's slides included a large number of orchids, which represent 10% or more of the species in the Grampians. A highlight of the slides was an area on Mitchell Plateau apparently covered with *Sprengelia incarnata* and *Melaleuca squamea.* Mr. Fuhrer ended his talk with beautiful slides of birds' nest fungus, coral fungus, and a superb picture of a koala in a manna gum tree. Mr. Fairhall called for a vote of thanks to Mr. Fuhrer and this was carried by acclamation.

An excursion was arranged for Sunday, 30 March, meeting at Darebin station at 10.30 a.m., proceeding to Mr. Ivo Hammet's garden in the morning, and after lunch inspecting the native plant nursery of Mr. and Mrs. Cleeves, who always bring in to our meetings an interesting selection of their plants.

Geology Report—2 April

Thirty members and visitors attended with Mr. Davidson occupying the chair. The speaker for the evening was Dr. D. Spencer-Jones, of the Mines Department of Victoria. His talk was entitled. "The Grampians Range of Western Victoria". He began by giving a brief historical account of the area. He said there has been much evidence of aboriginal occupation around the northern end of the Range, patriculary in the Victoria Range where shelters and cave paintings are to be found. However, the first white man in the area was Major Mitchell, who climbed Mt. William in July 1836. Since then, he said, the Grampians have become a mecca for botanists, geologists, naturalists and tourists. He said that the oldest rocks are Greenstones of Cambrian age which underlie Graywackes and Siltstones of Lower Ordovician age. In the Middle to Upper Devonian times, Rhyolites and associated acid lavas were extruded. These are basal to the Conglomerates and to the Sandstones which constitute the main formations of the area. These are considered to be of the Upper Devonian-Lower Carboniferous age. In the Middle Carboniferous, Granites intruded the existing rocks. These grade from Hornblende-Diorite at the northern end to Soda Granites at the southern end. The speaker said that the spectacular escarpments to be seen in the Grampians are the result of high angle thrust faults. He said the huge Upper Dev-Lower Carboniferous deposits were laid down in swamps and lakes, and appear unfossiliferous. However, the sea invaded the area on at least one occasion, as a band of marine deposits contain a species of Ligula, a marine brachiopod. The speaker also said that the rocks have become indurated, and this is very noticeable at McKenzie's Falls area, caused by induration of Rhyolites into sedimentary rocks. Dr. Spencer-Jones accompanied his talk with an excellent series of slides of the various formations. Mr. Davidson thanked Dr. Spencer-Jones for a most interesting and informative talk.

Exhibits

Mr. Blackburn. — Basalt, showing tachylitic selvedge and decomposition to palagonite.

Mr. Dodds. — Fossil shells, corals, haematite from Moonlight Head-Worm Bay area.

"Odd Pictures of Odd Places in Australia"

This lecture, to be given by Mr. Claude Austin, in the National Herbarium at 8 p.m., is on Wednesday, 28 May.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12 May—Annual Meeting at National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Amendments. 2. Correspondence.
3. Subject for evening—"Distribution of Australian Aboriginal Tribes", by Dr. Norman B. Tindale, who will also be presented with the 1968 Natural History Medallion.
4. New Members
   (a) *Ordinary:*
   Rev. J. C. W. Brown, 93 Station Street, Malvern 3144. (Interest: Photography of Victorian flowers and fungi.)
   Miss A. Rangott, C/o Box Hill and District Hospital, Nelsen Road, Box Hill 3128.
   (b) *Joint Ordinary:*
   Mrs. B. M. Timms, Zoology Department, Monash University, Clayton 3168.
   Mr. and Mrs. H. F. Janssen, 29a Myrtle Grove, Blackburn 3130. (Mammal Survey.)
   (c) *Country:*
   Major R. P. Webb, School of Signals, Balcombe Military P.O. 3935.
   Mrs. Alice G. Price, Private Bag, Hopetoun, Vic. 3396.
   Mrs. L. A. Moroni, 84 Napoleon Crescent, White Hills, Bendigo 3550.
   (d) *Junior:*
   Mr. Anthony J. Simon, 38 Madden Street, Maidstone 3012. (Mammal Survey.)
   Mr. Paul C. Carswell, 192 Rathmines Road, East Hawthorn 3123. (Natural History generally.)
   Mr. Peter J. Thomas, 79 Mountainview Parade, Rosanna 3084.
5. General Business. 6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated.)

Wednesday, 14 May—Microscopical Group.

Friday, 30 May—Junior Meeting at Hawthorn Town Hall.

Monday, 2 June—Marine Biology and Entomology Group, at National Herbarium.

Wednesday, 4 June—Geology Group.

Thursday, 5 June—Mammal Survey Group, at Fisheries and Wildlife Dept. Library, Flinders Street Extension at 7.45 p.m.

Friday, 6 June—Junior meeting at Rechabite Hall, 251 High Street, Preston, at 8 p.m.

Thursday, 12 June—Botany Group. "Orchids", by Miss C. E. Gray.

Friday, 13 June—Montmorency District Junior F.N.C., held in Scout Hall, Petrie Park, at 7.30 p.m. "Frogs and Tadpoles of the Melbourne Area".—Graham Watson.

F.N.C.V. EXCURSIONS

Sunday, 11 May—Botany Group excursion to Ferntree Gully to see what regrowth has occurred since the fires. Meet at Ferntree Gully station at 10.15 a.m.

Sunday, 18 May—Dandenong Ranges. Ferns and general nature. Leader: Miss M. Lester. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.50, bring one meal.

29 August-21 September—Western Australia. The party will leave Melbourne by train on Friday evening, 29 August, and arrive in Perth Monday morning, 1 September. A coach will meet the train and take members to Jurien Bay, then Northampton, where they will stay for three days with day trips to places of interest. From Northampton the party will travel south as far as Albany, across to Manjimup and Busselton, visit Augusta, and arrive back in Perth on Tuesday, 16 September. Wednesday there will probably be an optional trip to Rottnest Island and the party will leave Thursday evening on the train for Melbourne, arriving Sunday morning. Cost is approximately $260.00 with deposit of $50.00 to be paid when booking, and the balance before 1 August. All cheques to be made out to "Excursion Trust", and sent to the excursion secretary, Miss M. Allender, 19 Hawthorn Avenue, North Caulfield, 3161. At present the excursion is booked out, but names will be taken in case of cancellations. The excursion secretary would be pleased to receive advice of items of natural history interest along the route, and hopes Western Australian naturalists in these areas will contact the party and, where possible, join in the excursion.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Vice-Presidents: MR. JEFFS, MR. T. SAULT

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Hon. Treasurer: MR. D. E. MCINNES, 129 Waverley Road, East Malvern, 3145 (211 2427)

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Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: MRS. N. E. LEWIS, 1 Billing Street, Springvale 3171. (546 4649).)

Sales Officer: MR. B. FUHRER, c/o National Herbarium, The Domain, Sth. Yarra.

Group Secretaries:

Botany: MISS M. BUTCHART, 23 Loch Street, Hawthorn East 3123 (82 1616).

Geology: MR. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: MR. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1969

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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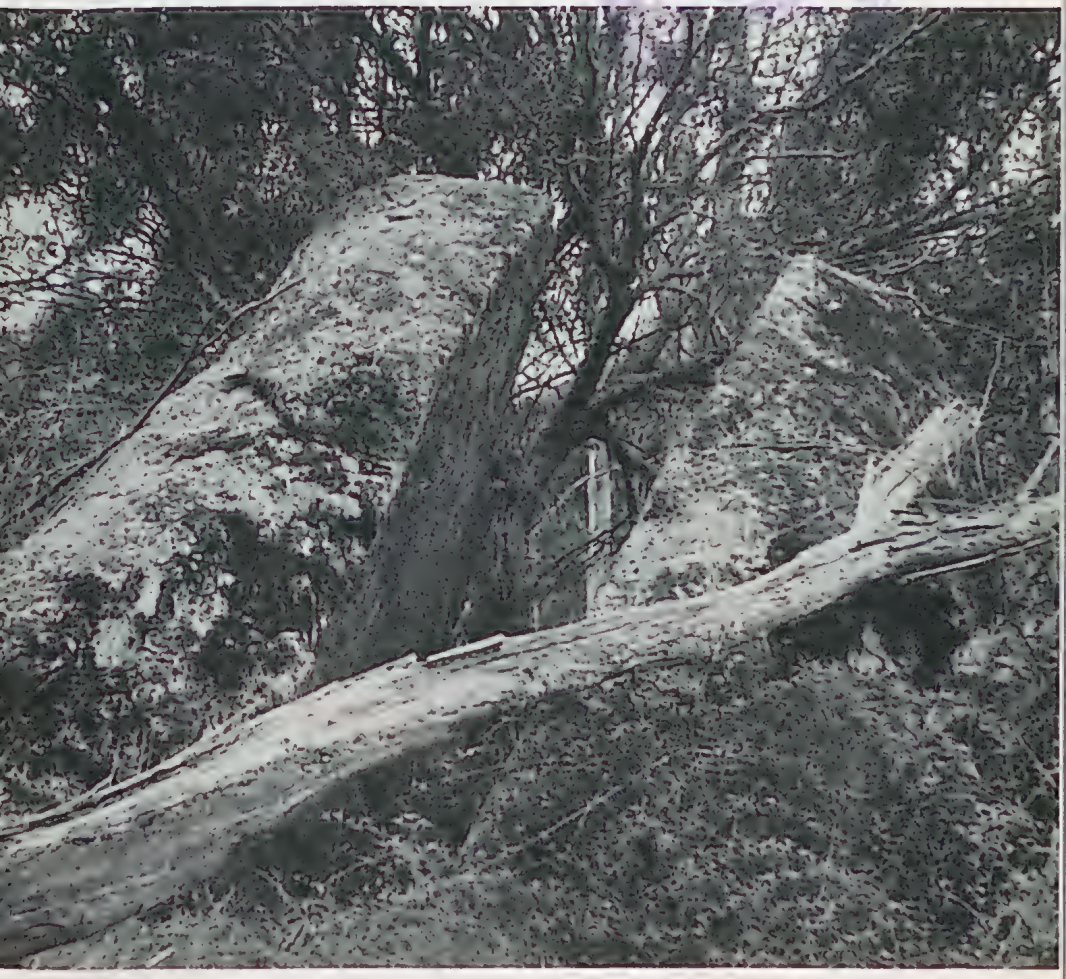

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A Huddle of Elephant Seals on Heard Island

Photo: J. Béchervaise

Lecture

At Nicholas Hall in Lonsdale Street at 8 p.m. on Friday, 15 August, Mr. John Béchervaise will lecture on Albatrosses. The Native Fauna Conservation Society are sponsoring the meeting. A silver coin to cover expenses, is asked to be subscribed.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

F.N.C.V.

Vol. 86, No. 6 5 June, 1969

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Front Cover:

A large granite tor, split open along a joint plane by repeated daily heating and cooling over a considerable period of time. The boulder is within the Tidbinbilla National Park. Situated some 30 miles west of Canberra, A.C.T.

photo: Ken G. Simpson

CORRECTION—The editor apologizes for his obvious mistake in the caption for the cover photo in the April, *Vict. Nat.* The moth was of course a female, not a male Gum Emporer Moth.

Axe-Grinding Rocks near Munro, Central Gippsland, Victoria

by ALAN L. WEST*

Introduction

This paper provides detailed information concerning four contiguous axe-grinding workshops near Munro, seven miles east of Stratford in central Gippsland, Victoria. The rocks are low outcrops of horizontally-bedded ferruginous sandstone.

Two of the outcrops (here designated Sites 2 and 3) were briefly mentioned by Massola (1967) but to my knowledge there does not exist an adequate description of this type of relic in Victoria.

Massola (1962, 1964, 1965, 1968) has given the location of, and some information on, other similar sites in Victoria. In Gippsland, apart from the four sites described here, there is another at Boisdale, approximately thirteen miles west of the Munro rocks. Another is situated at Earlston in north-eastern Victoria. In the Western District, there are two known outcrops where grinding rocks exist, one at Gellibrand and a second on the property "Fernlea", formerly part of Nareeb Station, about fourteen miles south of the Glenthompson.

In the manufacture of ground-edge axes, pieces of suitable stone were prepared by flaking or by flaking and hammer-dressing. These roughly shaped blanks were then ground by being rubbed on softer stone. Where suitable sandstone outcrops existed, the fixed rocks were utilized but in the absence of these, portable stones were used.

Spencer (1928) has given an account of the axe-grinding process. The Aboriginal he observed took a sandstone mill, or "nardoo stone", and rubbed his axe backwards and forwards on it in order to produce a suitable cutting edge. Sand and water, occasionally sprinkled on the mill, gave additional abrasive qualities to the grinding block. The rocks at Munro were probably used in much the same way but would have had the advantage of being fixed in the ground.

Location of the Grinding Rocks

The axe-grinding rocks at Munro are almost equi-distant between the Avon River at Stratford, seven miles to the west, and the Perry River to the east. Lake Wellington at the western end of the Gippsland Lakes system lies some nine miles to the south-east.

Site 1, the most northerly of the four workshops is located beside and to the north of the Prince's Highway on the property "Blue Hills", owned by Mr. S. Dunsmuir. The remaining sites are situated approximately in a straight line over a distance of 1 mile 35 chains to the south-east of Site 1. They are all south of the Prince's Highway. Sites 2 and 3 are both on the property "Eastwood", owned by Mr. S. C. Fletcher, and Site 4 is on the "Fernbank" property of Mrs. U. Rash. Exact location references are give in Table 1 below, and the sites are shown in map, Fig. 1.

* Curator in Anthropology, National Museum of Victoria, Russell Street, Melbourne, Victoria.

TABLE 1

Location of Axe-grinding Sites, near Munro, Central Gippsland, Victoria.

Site	Lot Numbers on Parish Plan (Yeerung, Country of Tanjil, 2″ to 1 mile, Dept. of Lands and Survey, Melb. 1959)	Central Gippsland, Victoria Grid References on Aerial Survey Map (Stratford C, First Ed. Std 2″ to 1 mile Series)
1	17	175227
2	28	181218
3	28	189213
4	14	191211

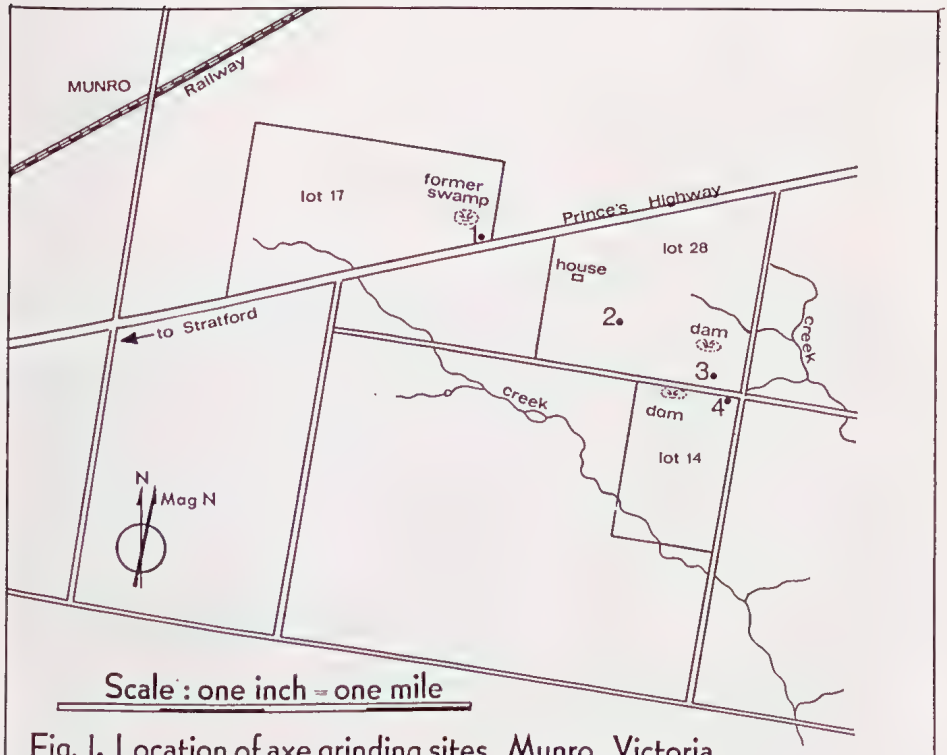

Fig. 1. Location of axe grinding sites, Munro, Victoria.

After State Aerial Survey Map, Standard Series, First Edition.

General

Between May 1967 and September 1968 a total of six days was spent in studying and recording the Munro workshops. On one visit lasting three days the author was accompanied by Mr. R. Miller, of the Education Service of the National Museum of Victoria. Drawings of all the grinding rocks with their associated grooves were made by Mr. Miller in addition to plans showing the distribution of the abraded rocks at each site. Figure 3 shows the plan of Site 3 with drawings of the rocks and axe-grinding grooves.

Table 2 gives the dimensions of the exposed parts of the rocks at each site, and of the grinding grooves.

TABLE 2

Dimensions* of Grinding Rocks and Grooves at Sites 1 to 4, near Munro, Central Gippsland, Victoria.

* All measurements in inches.

Site Number	Exposed Surface of Rocks Length	Exposed Surface of Rocks Width	No. of Grinding Grooves per rock	Grinding Grooves Length	Grinding Grooves Width	Grinding Grooves Depth
1 A	27	17	2	5	2½	3/16
				6	2½	¼
B	31	16½	2	9½	4	⅝
				12	6½	⅝
				*10	3	7/16
C	21	12	1	7½	4	½
D	19	13	1	12	4½	5/16
E	17	12		12	4½	¾
			2	*7½	1½	3/16
				5	2½	3/16
F	18	9½	1	7½	3	½
G	14½	13	1	10½	4½	¼
2 A	42	26		6	2	3/16
				9	2½	¼
			4	7½	2	⅜
				9½	3	½
B	26	15	1	13	8½	1
C	30	17	2	8	2½	9/16
				16	6	1
D	14	7	1	7	2½	⅜
E	27	17	1	9	2½	5/16
F	38	22	1	10	3½	9/16
G	15	9	1	7½	3	5/16
H	21	9½	1	8	2½	⅜
I	16	15	1	12	3½	5/16
3 A	26	14	2	6¼	2	3/16
				13	9	1⅛
B	14	10	1	9	6½	½
C	25	11		13	6½	1
			3	7	2½	⅝
				7	2¼	¼
D	40	22		10	2½	⅝
			3	9	6	⅝
				8½	3½	¾
4 A	43	19	1	9	4½	1
B	20	18	1	8½	5½	⅝
C	31	23		8½	2½	¾
			3	11	2½	⅜
				8½	5	½
D	21½	16½	1	11	6½	⅝
E	38	33	1	19	8	1⅛
				*10	4	—
F	39	23	1	9	6	1

* A second grinding facet extending the main groove.

Description of Sites

Site 1—

The grinding rocks of Site 1 are found in the south-east corner of a cleared paddock (Lot 17) amongst a scattered sandstone outcrop; they rise from one to three inches above the present soil surface. The stone, similar to that at all of the sites, is reddish coloured. It varies in texture, but much is composed of grit-sized grains of uniform size. Seven of the boulders at the outcrop, obviously carefully selected because of their suitability for axe-grinding purposes, bear a total of 11 abraded grooves. They are distributed over an area of 130 feet (N-S) by 186 (E-W).

One of the axe-grinding rocks at this site (Rock E), was found to have been recently partly excavated, and with the permission of the property owner it was removed and added to the collections of the National Museum of Victoria. (x72485, see Plate.)

The grooves vary in length from 5″ to 12″, in width from 1½″ to 6½″, and in depth from ¼″ to ¾″. Because of alluvial soil build-up there may well be additional grinding rocks, as yet undetected, at Site 1. The same could apply to Sites 2 and 4. Eight chains from the workshop, in a north-westerly direction, a depression exists which before draining was a swamp. The Aborigines possibly drew water from this swamp for use in the axe-grinding process.

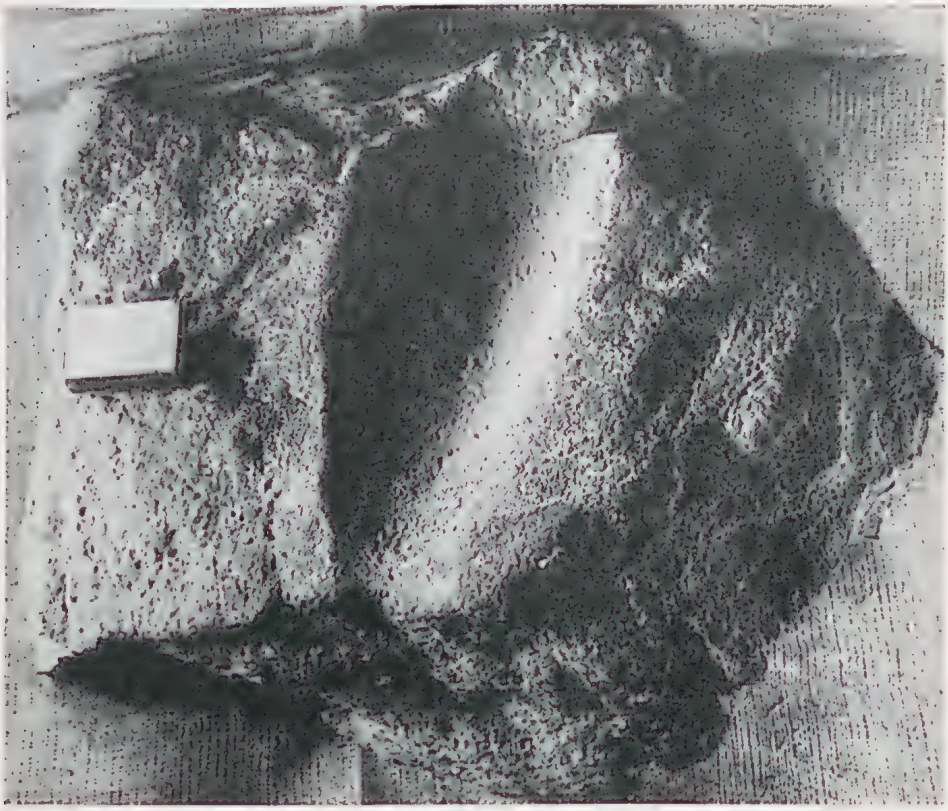

Plate 1.

Rock E, one of the axe-grinding rocks found at Site 1.

Site 2—

This is 63 chains to the south-east (111°)* of Site 1. Within a sandstone outcrop in a cultivated paddock (Lot 28) there are nine rocks which have been used to sharpen stone axes. The abraded rocks which outcrop no more than 6″, cover an area of 48 feet (N-S) by 27 feet (E-W). A total of 13 grooves range in length from 6″ to 16″, in width from 2″ to 8½″, and in depth from 3/16″ to 1″. Rock A of this group is 24 chains south-east (127°) of the "Eastwood" homestead. A dam constructed in a former swamp lies 35 chains to the east (98°).

Site 3—

This is also situated in a cultivated paddock on "Eastwood" but is 42 chains south-east (112°) of Site 2. At this workshop four sandstone rocks, which outcrop 1″ to 2½″, bear nine axe-grinding grooves. A loose piece of freshly shattered rock† measuring 6½″ x 4″ x 2½″ and bearing part of an axe-grinding groove 4″ x 2¾″ x ⅜″ was found at this site. It is evidence that at least one of the original rocks may have disappeared. Before the area around the present rocks was cultivated, the site may well have been more extensive. The existing abraded rocks lie roughly in a straight line north-west to south-east and cover a distance of 24 feet. The grinding grooves vary from 6¼″ to 13″ in length, from 2″ to 9″ in width, and from ¼″ to 1⅛″ in depth.

Between May 1967 and September 1968 Rock A was accidentally damaged by a heavy earth-moving machine. The result was that the smaller of the two grooves (see Table 2) has, in part, been fractured from the rock surface and now measures only 6¼″ x 2″. Before damage it was probably 9″ x 3″ (see Massola 1967, p. 209, Group 2, Rock C). Two nearby dams indicate the sites of former swamps. One to the north-west (341°) is 11 chains away, and the other is south-west, also 11 chains distant, in a paddock (Lot 14) on the property of Mrs. U. Rash. Site 4 (below) is 17 chains east (90°) of this dam.

Site 4—

This is located 10½ chains to the south-east (138°) of Site 3, on the "Fernbank" property of Mrs. U. Rash. The six grooved rocks are part of an extensive low outcrop of sandstone in the north-east corner of Lot 14, a cultivated paddock. Five of the rocks are scattered over an area of 44 feet (N-S) by 37 feet (E-W); Rock A is separated from the others by a distance of almost two chains. There are eight grinding grooves, in all, ranging from 8½″ to 19″ in length, 2½″ to 8″ in width, and in depth from ⅜″ to 1⅛″.

Discussion

Massola's paper (1967), which includes references to Munro Sites 2 and 3, goes beyond the evidence in drawing conclusions. In effect his argument is that the narrower grinding grooves were places where "ordinary" axes were ground, whereas the wider grooves (in excess of 5″) resulted from the grinding of large "super-axes". He claims also that the "super-axes" were used as hoes to dig out wombats, but it is most improbable that stone axes of any kind were used for this purpose.‡

The Aborigines of Gippsland did not make ground-edge axes which could appropriately be called "super-axes". Further, it will be seen from Table 2 that only 12 of 41 grinding grooves at Munro are 5″ or more in width. Five of these reveal features which negate

* Magnetic North compass readings given throughout.

† N. M. V. X 72202.

‡ See Buckley's account of wombat excavation carried out with digging sticks, and baskets for earth removal, in Morgan (1967).

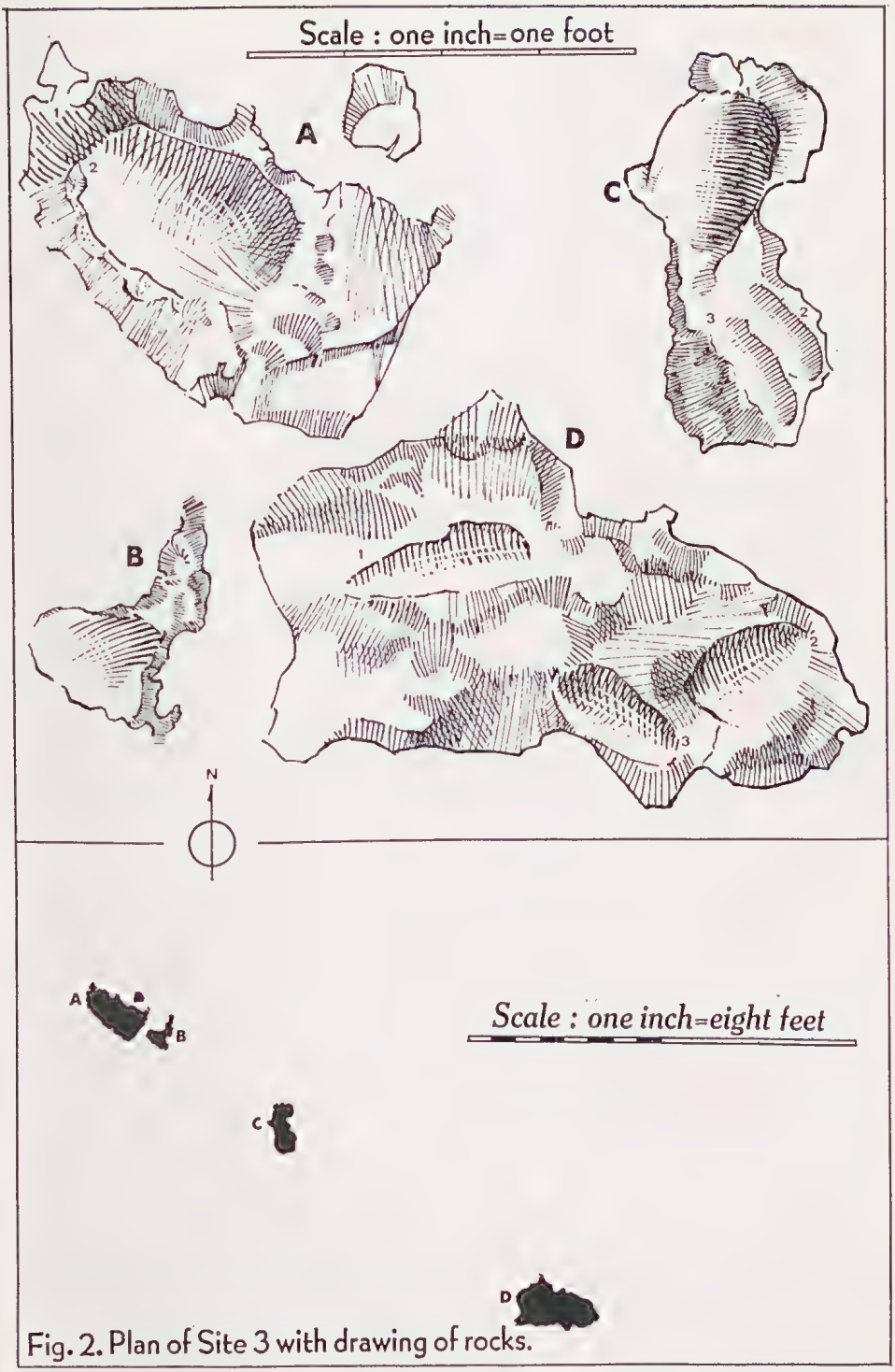

Fig. 2. Plan of Site 3 with drawing of rocks.

any "super-axe" supposition. For instance, the groove on Rock E at Site 4 has a second grinding area extending for 10″ along its eastern side. This is 4″ wide, and had the grinding process continued it is most likely that the main groove and the extension would have merged into one very wide depression. There is a similar grinding extension on the southern side of Groove 2, Rock B at Site 1.

Three other wide grooves (G1, B, S4; G1, D, S4; G1, F, S4) have surface irregularities within them indicating multiple grinding areas. Within the depression on Rock D above, three grinding grooves can both be seen and felt and there two grinding *slots* within each of the other two. We suggest therefore that a simpler explanation for the wide grinding grooves at Munro, and one which accords better with the evidence, is that they were formed by the merging of two or more narrower depressions. Compare the widening grinding-facet alongside the main groove on Rock E, Site 1 (Plate) and the drawing of merging grooves 2 and 3 on Rock C, Site 3 (Fig. 2).

However, the Munro grinding rocks are prehistoric relics. All that can be said with confidence, is that stone axes were ground thereon. In Fig. 3, the lenticular cross-section of a ground-edge axe is shown adjacent to the transverse cross-section of a typical grinding groove. A comparison of the two cross-sections reveals a very neat *fit*; the convex shape of the axe matches the concavity which was formed in the softer sandstone rock by grinding action.

The stone axe figured (N. M. V. 34610—Provenance, Murray River) was randomly selected from the collections of the National Museum of Victoria, but is typical in shape, size and cross-section of many of the axes found in Victoria. It measures 5 1/10″ x 3 3/10″ x 1½″, is oval in shape and has a cutting edge which approximates a parabolic curve, About 1″ or 1/5 of each surface has been ground, and the butt-end shows the kind of pecking associated with use as a hammer stone.

It is not possible to determine when the grinding rocks were first used by Aborigines. Nor do we have any evi-

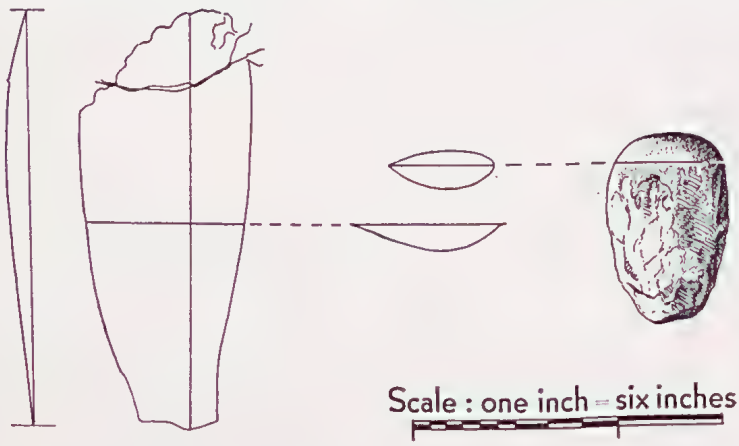

Fig. 3. Plan of Grinding Groove I, Rock E, Site I with longitudinal and transverse cross-sections. Transverse cross-section of groove is related to the cross-section of an edge-ground axe.

dence that they were being used at the time of European occupation of Central Gippsland, from 1840 onwards, although it is reasonable to suppose they were. If this were so, it is almost certain that they were abandoned by the early 1860's for two reasons. Firstly, the Aboriginal population had fallen away to a mere 53 individuals (Central Board for the Protection of Aborigines, Second Report, 1862) and secondly, steel axes were introduced to the Aborigines by the Central Board. The Board's first report (1861) records that six dozen tomahawks were sent to the local protector, at Stratford, in a consignment of goods for the benefit of Aborigines.

Acknowledgements

The names of five Munro property owners who permitted me to have access to sites on their land are mentioned in the text. I am grateful to all for their co-operation, especially to Mr. S. C. Fletcher and Mr. S. Dunsmuir. Mr. R. Miller prepared the map and drawings for this paper and I wish to express my thanks to him. Helpful comments on the text were made by Messrs. D. A. Casey and K. G. Simpson.

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First, 1861, p. 33.
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Appendix

Details of the position of two further axe-grinding sites, in the Munro area, were given to the National Museum towards the close of investigations into the sites described here.

The more extensive of the two new finds has yet to be fully recorded. The rock is in the south-west corner of Lot 8, Yeerung Sheet of the Parish Plan, on the property of Mr. N. Lee of Munro. It is situated a few yards north of Flinders Creek which cuts diagonally across the corner of the paddock, and is to the west of a ruined house. The grid reference of the Aerial Survey Map is 153192.

The sandstone outcrop, approximately 9′ x 3′ bears about 14 grinding grooves. Some grooves are clearly defined but others are quite shallow. The abraded rock has a texture of uniform grain size and was apparently selected as the only rock in the outcrop suitable for grinding purposes. By contrast, the texture of other outcropping rocks is irregular, pebbly and coarse-grained.

On the nearby property of Mr. A. L. Maguire, two small sandstone rocks, which outcrop no more than 2″ above the present surface, each contain one grinding groove. The rocks are in the south-west corner of Lot 22A, Yeerung Sheet of the Parish Plan, to the north of Fiddlers Creek.

One rock, still in situ, has an exposed surface of 39″ x 17″ and an axe-grinding groove which measures 12″ x 8″ x 2″.

A rock immediately adjacent, with only 8″ x 3″ exposed, was excavated by Mr. Maguire. When not in situ it measured 21″ x 11″ x 9″ and was marked by a grinding groove 9″ x 5″ x 1″.

FNCV Grampians Excursion, September, 1968

by J. A. Baines

Part 1

Saturday, August 31—The chartered coach went via Bacchus Marsh and Ballarat (where a deviation was made past the site in Humffray Street of the finding of the Welcome nugget) to Lake Learmonth, where an early lunch in the lakeside park was enjoyed. Through the Pyrenees there were further reminders of the golden years, and at Amphitheatre most of the party left the bus for a roadside walk. Passing a sign post leading to Nowhere Creek, the route led through Elmhurst, which belied its name with an avenue of pines. Ben Nevis, 2876 feet, forested, with steep rock scarps, brought a touch of nostalgia to Mrs. Lindsay Stuart-Smith (who hails from Fifeshire, Scotland).

From Ararat the route taken to Hall's Gap was via Moyston. There was further roadside botanizing near Pomonal, and this introduction to the Grampians flora was highlighted for those of the party who are more familiar with species seen on the monthly day excursions from Melbourne by the prolific flowering of Golden Heath (*Styphelia adscendens*) and Flame Heath (*S. behrii*, syn. *Astroloma conostephioides*). At Hall's Gap accommodation was at Mountain Grand guest house, with its adjunct Grampian House, where Mr. Eric Miles, who lives locally but is a member of Stawell F.N.C., called to welcome the visitors and to outline plans for the morrow.

Sunday, September 1—The writer shared the front seat with Eric Miles, who indicated points of interest as we passed the old "Mokepilly" station and searched vainly a roadside lagoon for a Maned Goose or Wood Duck, which he had observed there several times. Its scientific name, *Chenonetta jubata*, is most apt, the generic name being Greek for "goose-duck" and the specific name Latin for "maned". Lake Lonsdale was visible in the distance, with Briggs Bluff beyond. "Ledcourt" station was notable for the information that one of its boundary riders in colonial times was Marcus Clarke, author of "For the Term of his Natural Life". We passed over Mount William Creek at Dadswell's Bridge. Much water was lying about, as the district had seven inches of rain in August. This was emu country, according to Eric, who retired to Hall's Gap after many years of farming at Mystic Park, where he often played tennis with the John Gorton who was to become prime minister.

Near the Mount Stapylton aboriginal cave shelters we were met by several car loads of members of Stawell F.N.C. (led by Mr. Ian McCann, president, and Neil Bennett, secretary), Horsham F.N.C. and Ararat F.N.C. It was a delight to find, plentiful and flowering profusely, the solanaceous shrub, *Anthocercis frondosa*, the large-leaf Ray-flower, which is rare and localized in Victoria though extending to New South Wales. At the cave site acres of *Thryptomene calycina* were in bloom, and it is good to know that this symbol of the Grampians is more adequately protected these days. A surprise was meeting there Bruce Fuhrer and his family, who had been to Kiata Lowan Sanctuary and had called at the home of Ian McCann and heard of our im-

pending visit to Mount Zero. Bruce was photographing a liverwort, and his obvious enthusiasm has not been dampened by the tremendous task recently completed with the publication of "Flowers and Plants of Victoria" (a book which, incidentally, was most useful on this trip). Lunch was taken at the picnic ground, and Ian (Dick) Morrison photographed fungi (two Morels, an Earth-star, *Geastrum triplex*, and the tiny Bird's nest Fungus, *Nidula emodens*).

The next point of interest was another shelter with aboriginal paintings (all the Grampians sites have been fully described in the *Naturalist*, so no further comment will be made on these). Grampians Heath, *Epacris impressa* var. *grandiflora*, was flowering magnificently here, and Skeleton Fork-fern, *Psilotum nudum*, was growing from clefts in the rock chasm. Hairy Correa, *C. aemula*, was common, with its characteristic hairy leaves, grey-green flowers with pink tips, and low habit of growth. Back to the bus, then we passed Mount Zero on one side and olive orchards on the other, on the way to the so-called Cave of Ghosts (or Ghost Cave), which of course is not a cave but a rock shelter, and an aboriginal water well (from a natural spring under rock). Botanical highlights here were an unusual Cup Fungus (*Peziza* sp.) (perhaps undescribed), and a superb clump of Grampians Heath.

The return trip was via Zumstein's, with its many kangaroos (encouraged by the late apiarist, William Zumstein, a booklet* about whose life was made available to us by Mrs. McKenzie, one of the Horsham F.N.C. members). The view of Mount Rosea in the distance reminded us of its distinctive Rosy Bush-pea, *Pultenaea subalpina*, seen by some of us on previous visits, and we regretted that it would not be able to be visited this time because of a full itinerary. (We saw this species later on Mt. William, but of course its flowering season is much later.) The impressive rocky mountain slope known as the Elephant's Hide was passed before arriving back at Hall's Gap. That night there was poring over botanical books, and reading "The Grampians of Western Victoria—An Introduction", an eight-page publication issued by Stawell Town Council in conjunction with the Stawell and Grampians Tourist and Promotion Advisory Council, which had been issued to us by Mr. Ian McCann, now full-time Tourist Officer employed by the council, which deserves credit for this enlightened move. No greater authority on the area could be found than Ian, the ideal appointee for the position, and it is to be hoped that the three-year initial term will become a permanent job. The writer read "The Moora Savage", by James R. D'Alton, a member of the family so long associated with the Grampians, of whom St. Eloy D'Alton, an early contributor of botanical articles to the *Victorian Naturalist*, is best remembered. The author of the booklet of Grampians reminiscences (with its foreword by F.N.C.V. member, Mr. A. J. Swaby, who has a wide knowledge of the Grampians and its flora) died not long after the time of our visit.

Monday, September 2—Mount William trip.

Just south of Hall's Gap the valley of Fyans Creek has been dammed to form Lake Bellfield. Completed in 1966, the earth and rock-fill dam (2,286,000 cubic yards) has a crest length of 2700 feet and a maximum height of 165 feet. The storage, which we observed from the neatly built pavilion close to the road, was as yet only half full, because of the drought

* "Walter Zumstein, Pioneer" (1885-1963), published by Horsham District Historical Society.

years following construction, but with better rains the capacity of 64,000 acre feet should soon be reached. The tenacity of life of some native shrubs inundated was noted (another legacy of the drier times?). (Another example of this tenacity we had noted on passing Mrs. Bennett's property, where *Micromyrtus ciliatus* was persistent in great masses on land that had been ploughed (Deep Lead district).)

Passing over Barney's Creek, then Bovine Creek, there was speculation as to whether the latter name had any connexion with the famous "White Bull" (the Moora Savage), whose stamping ground was the Moora Swamp (Murra Murra). Those who had climbed to the summit of Mt. William in the days before the new road was built certainly earned the magnificent views that the ascent opens up—we did it the comparatively easy way. Debussing at the turntable, we passed through the gate that barred the final stretch of road to all wheeled vehicles except those of Department of Civil Aviation personnel using the modern brick building on the summit. The road was built jointly by the Country Roads Board, Tourist Development Authority, and the Commonwealth Department of Works. The one mile walk was full of botanical and geological interest, while Ken Strong (microscopist) found interesting insects and rare crustaceans. The splendour of the mountain views was something to remember and treasure, but when sunshine was followed by quick clouding over and steady drizzle, one was reminded of the bleak weather when Major Mitchell and his party had to spend a cheerless night on the summit; a tablet on the lookout (unveiled by Mr. Mibus, Minister for Water Supply and Mines, in 1963) commemorates this 1836 occasion. The dial indicator identified the great number of peaks and lakes visible from this highest point of the Grampians (3829 feet).

It was interesting to encounter here two species usually confined to coastal habitats, Coast Beard-heath, *Leucopogon parviflorus*, and *Banksia integrifolia*, Coast Banksia. Very noticeable, despite its low habit of growth, was the dainty Pine Heath, *Styphelia pinifolia*, and also prominent were Woolly Tea-tree, *Leptospernum lanigerum*, and Dwarf Sheoak, *Casuarina pusilla*. Grampians Gum, *Eucalyptus alpina*, was here, but apparently it is much more common on the adjoining Major Mitchell Plateau, which looked enticingly close despite its as yet comparative inaccessibility. After lunch on the summit, a cold and rather damp walk brought us back to the bus.

Near Lake Bellfield we turned off to Silverband Falls. On the way a stop was made to admire (and photograph) two koalas, in an area specially declared a natural sanctuary for native fauna. Near the falls there were many trees of Cherry Ballart (*Exocarpos cupressiformis*). On to Stony Creek Road, with a view of Sundial Peak, then a walk into a fern gully. A Scrub Wren was observed on the ground near the bus. After the fern gully walk, the billy was boiled for tea in a clearing, during rain which later ceased. On the way back to Hall's Gap we saw many kangaroos in a grassy paddock beside Hotel Le Chateau (where some of us had stayed in its Hotel Bellfield days). According to Mrs. Miles, whose company we enjoyed on this trip, the present licensee is a keen protector of native animals and the kangaroos find a congenial environment near his accommodation house. At night the writer re-read "One of Nature's Wonderlands: The Victorian Grampians", by J. W. Audas, which can be strongly recommended, although unfortunately long out of print.

Tuesday, September 3—We awoke to the sound of early morning howling winds, but despite this, there was a particularly varied dawn chorus of bird voices, as well as the usual "crying" of a koala that lived in a tree nearby. A bus trip followed, to Stawell and up to Big Hill, where masses of wattle were in bloom (*Acacia pycnantha* and *A. armata*). From the rotunda erected in 1947 as a pioneers' memorial, sites of former gold-mining activities were pointed out, then began a walk of a mile and a half past the old mine workings of Big Hill, Perthshire Hill, Hampshire Hill and Albion respectively. The many species of flora noticed are listed in the appendix, as in the case of most other areas visited. Returning to the bus, we went on past Concongella, and then, near the J. J. Kingston Memorial Sanctuary, (a ten acre reserve set apart through the efforts of Stawell F.N.C., whose secretary, Mr. Neil Bennett, was our guide for this day), the bus became bogged in roadside slush. Opportunity was taken to botanize nearby, where the chief attraction was a great number of Blue Caladenia (*C. caerulea*). In one square inch spot there were blooming, a specimen of this lovely orchid, Golden Moths or Snake Orchid (*Diuris pedunculata*) and Scented Sundew (*Drosera whittakeri*). The sundew rosettes practically covered the ground in some parts, the white flowers above the reddish leaves producing a beautiful effect. Lunch was taken in a clearing, then a return was made to Stawell, driving past the sites of the famous Magdala mine (closed 1918) and Oriental mines, then North Cross No. 1 and No. 2 ("The Duke"—depth of shaft 1280 feet).

Neil Bennett next directed us out to the Three Jacks Sanctuary of 18 acres, named after the former mine not far away. It is good to know that this excellent piece of natural bushland will be a permanent refuge for the many species of local flora thriving there. Dusky Wood-swallows and Black-faced Cuckoo-shrikes were noticed here.

Next we walked over Mrs. Bennett's Deep Lead property, with Fringed Heath-myrtle (*Micromyrtus ciliatus*) a dominant plant and very floriferous. A Shingleback Lizard or Stumpy-tail (*Trachydosaurus rugosus*) was examined, and tertiary fossils in ironstone were pointed out. A remarkable phenomenon was seven different species of fern growing in an old mine shaft twenty feet deep. Neil alarmed some of the party by climbing down most of the way, but he shrugged off the danger by saying he had often gone right down in his boyhood days. The nearest other ferns are in the Grampians. *Cyathea australis*, *Adiantum aethiopicum*, and two species of *Blechnum* were identifiable. The original spores were obviously blown here by the wind, but no spores are being produced by these ferns because the conditions are not right for the reproductive processes to be set in motion. A huge area surrounding a large dam was covered in *Micromyrtus*. Back in the bus the writer sat next to Mrs. Bennett, who pointed out the unusual monument to the Deep Lead miners, erected in 1951, and consisting of two tool-carrying miners between a goat and a sheep. Presumably the goat is the animal symbol of the hectic days when Deep Lead was a prosperous and populous town and the sheep represents the succeeding pastoral era. Among the Deep Lead pioneers were the family of the late state school inspector, Mr. James Davidson, who did much to encourage in pupils a love of our native flora and fauna, a great lover of our birds. "Shepherd's Gold: The Story of Stawell", by C. E. Sayers, contains full historical details about Stawell district.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Little Cuckoo-shrikes and White-winged Trillers

These notes come from Mr. Victor Jacobs, of Narre Warren North.

At Easter, 1966, I made my first sighting of a Little Cuckoo-shrike between Stawell and Landsborough. My comments in *Vict. Nat.* **8** (7), July, 1966, p. 169, evoked comments from Jean Galbraith and Mrs. J. A. Denney on the same species: *Vict. Nat.* **8** (9), Sept. 66, p. 231. In this latter magazine I also made a note of first sighting of a White-winged Triller at Eildon.

Since then I have not read any further notes from readers concerning these two species. The Little Cuckoo-shrike has been to me a rather rare bird. During January 1968 in the sand dunes west of Bastion Point I glimpsed a pair of these birds with a young one. I did not sight the Triller again until September 1968, when I called in at Lake Hattah. There, just north of the dry lake bad, I watched a pair of these birds (mainly the male), enjoying both their voices and their antics. From a vantage point on a fallen tree, the male would swoop into the long grass, retrieve a large hairy caterpillar, and return to the log. The next procedure was to slam the body of the caterpillar repeatedly against the side of the log until it was evacuated, and being thus tidied up it was quickly swallowed. Next day amidst the large Bulokes, half a mile south of the lake, two more males and one female were seen and heard.

On 1 November, at a Gould League of Bird Lovers' Field Day at Eltham Park, a pair of Trillers were seen returning to the high branch where they had built a nest. They were the first to be seen in the park since 1963. We were glad to see them, for the paucity of natural species in the park made this outing less like a Field Day, and more like a museum visit. The lecturers at the Bird Stations, armed with birds on loan from the National Museum, did a magnificent job under the trying conditions; and the children showed a remarkable restraint, considering that the Ravens, Magpies, Mudlarks, Crimson and Eastern Rosellas, Noisy Miners and Blackbirds that they saw, had long since been unable to flap a wing. Man, his buildings, and immigrant birds in the shape of sparrows, starlings and mynahs, are monopolising Eltham Park. The editor mentioned that this very state of affairs was being remarked upon in the early 1930s, *Vict. Nat.* **83**, p. 164,

To bring the birds back to Eltham seems to be an insurmountable problem at present; and to find suitable open areas within range of metropolitan schools, not easy.

With these thoughts in mind, Messrs. Mudge, Thomson, and Jacobs headed towards Churchill National Park on Cup Day. Not all the populace was following the horses, for a couple of large-scale picnics had filled the park more than I had seen before. Cars and people were there in abundance, and as a couple of little girls had lost themselves, there were even cars on the walking tracks. This National Park has now been completely fenced, and a new road constructed outside. Now the park can be closed and locked at night; which is a great improvement over the early days when anyone could have access at any time.

We spent two hours in the park, and in spite of the number of people, recorded twenty-seven species; many of which were plentiful. The only species which we did not see in its usual abundance was the Bell-Miner. The massive colony of these birds disappeared unaccountably in the short space of one weekend. We were pleased to hear a couple call and hope that the colony will build up again to its former size.

An elusive call led us from alongside the channel into the scrub. A copperhead snake, being surprised by us, looped on his track so that we detoured, but still tracked the call. At the other edge of the belt of scrub we located and identified our quarry as a White-winged

Triller. Just then a larger grey bird entered the area and perched with its mate close by. Three pairs of binoculars focused and three watchers agreed that we had sighted a pair of Little Cuckoo-shrikes. One of the trio had not seen the species for many years.

Later, during a telephone conversation with Reg Garner, the park ranger, I discovered that last spring he had counted ten pairs of the Trillers in the park at that time, but was not aware of the Little Cuckoo-shrikes. He also told me that the Yellow-tailed Black Cockatoos had raised a family in the park and had also been seen feeding in Police Paddocks. It is heartening to know that the proposal of a car racing track for this area has been quashed, and that eventually the Police Paddocks will be fenced and become an extension of the park.

With the Trillers so common this year I decided to walk through the adjacent wood at Narre Warren North to look for them therein. They were not apparent, but I recorded 29 species of bird during my short walk, and included in this total was a pair of Satin Flycatchers.

Did you have Trillers in your area this year? It could have been a record year for them, both in distribution and in number. If you have any records let us hear of them.

Cane Beetles and Toads

Mr. A. Fellows from Charters Towers, Queensland, again supplies some interesting observations.

A few years ago before Gammaxene had proved such a boon to sugar-cane farmers, on certain warm still evenings just before dusk, an odd cane-beetle or two might be encountered in the cane-fields.

Usually that presaged a hectic time to come very shortly, and if standing in a clearing in the cane, a sudden onrush of buzzing beetles made collisions, at least with some of them, inevitable.

Where they struck one, there they remained awhile, departing only when no beetle of opposite sex was found.

The din was terrific, their search in all directions frenzied, and one went out of bombarding range of a necessity. Such beetles strike with great force. In the dim light one could just discern the rapidly flying creatures in their desperate search, but the noise and numbers grew quickly less, to soon terminate entirely. Then a flash-light search showed all beetles in twos whether on cane, fence-posts, or tree-trunks. Odd ones had "crashed", and an industrious toad squatting below a light-bulb made the customary "bow" and tongue-flash scoring one half-dead beetle.

One moment the beetle was in the toad's mouth, but in the next moment, both of the toad's fore-feet raked its own mouth in desperation to eject the beetle forth-with. Grown beetles are obviously not a toad's diet under such circumstances.

I had noticed smaller, softer beetles were eaten readily, but despite several attempts at different times to "coax" a toad to try a hard-cased cane beetle, I never saw a toad try to swallow one except the occasion cited. Perhaps they all learnt the "hard" way just how unpalatable cane-beetles could be.

If they failed as beetle-eaters, they excelled as termite devourers, so doing a useful purpose that way.

One hears much argument about the toads, fouling many water-containers, etc., with dire results to poultry and domestic animals drinking there. Therefore their "economic value", I will leave to the judgement of others. Meanwhile, they multiply and range further north and west where they were never known before.

A rather dubious toad eyeing a cane beetle.

photo: Paul Cahan

The First Victorian Record of the Spotted Stingaree *Urolophus gigas* Scott

by Joan M. Dixon*

On 30th October 1968, Mr. N. le Soeuf netted a small ray in about three feet of water at Blairgowrie, Port Phillip Bay, Victoria. The specimen was transferred to Mr. C. S. le Soeuf's aquarium at Rosebud and was collected from there by the museum on 21st January, 1969. It was identified as a female spotted stingaree, *Urolophus gigas*.

The total length of the specimen is 326 mm., and the maximum width across the disc 176 mm. It is now registered as A351 in the collections of the National Museum of Victoria.

This species is easily recognisable in life. (Plate 1). The upper surface of the disc is predominately black, becoming purplish-brown at the periphery. It has a distinctive pattern of clearly defined, whitish, irregularly shaped markings which are absent in the mid-dorsal region. Within each of the pale areas lie numerous small black spots. The underside of the disc is pale at the centre and grey-brown towards the margin. A small adipose fin occurs on the tail just in front of the spine.

This specimen constitutes the first record of *Urolophus gigas* from Victorian waters. The species was described by Scott (1954) from a specimen collected at Port Noarlunga, South Australia, and the holotype lodged in the South Australian Museum. It has since been recorded from Spencer and St. Vincent Gulfs, South Australia (Scott, 1954).

Acknowledgments:

I wish to thank Mr. C. J. M. Glover (South Australian Museum) and Mr. R. J. McKay (Western Australian Museum) for their assistance in the preparation of this paper, and Mr. C. S. le Soeuf for providing the specimen.

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Plate 1.

Urolophus gigas Scott—Dorsal View of the first Victorian record. Collected from Blairgowrie, Port Phillip Bay, Victoria, October, 1968.

Photo: F. Guy

Book Reviews

A Portfolio of Australian Birds

by WILLIAM T. COOPER

Text by KEITH HINDWOOD

(Published by A. H. and A. W. Reed)

Stiff cloth cover with illustrated dust jacket. Approx. 11½" x 14". 52 pages with 25 colour plates. Price $9.95.

In William T. Cooper, Australia has a bird artist of outstanding ability. This collection of 25 bird paintings of our native species are to my mind the best ever produced by an Australian artist. It is in fact, extremely hard to differentiate between the plates, but I would select the plates of the Powerful Owl, the Eastern Whipbird, the Eastern Rosella, and the pair of Paradise Riflebirds as really outstanding examples of Mr. Cooper's ability. These masterpieces are painted by an artist who has grown up in the Australian bush, and who knows each individual species intimately.

The text with each illustration is by Australia's leading ornithologist, Keith Hindwood, of Sydney, N.S.W. It covers all fields relevant to the species —its history, its food, its breeding, its plumage changes, and its distribution, as only Hindwood can tell it. The combination of William T. Cooper and Keith Hindwood has produced a portfolio of outstanding artistry and fact. It is to be hoped that they will not stop at just this one book. We need many others of this standard; and if the 25 species covered in this volume give an indication of what we can expect in the future, then we can all look forward to further outstanding portfolios by this combination.

W. R. W.

Flowers and Plants of Victoria,

by G. R. COCHRANE, B. A. FUHRER, E. R. ROTHERAM and J. H. WILLIS.

Published by A. H. & A. W. Reed, 1968.

216 pages, inc. 543 col. plates, glossary, index, selected references, and biographical notes. $9.95.

The British botanists Gilmour and Walters once wrote feelingly of gathering botanical books as "implanting a rival but compatible, passion in their breasts". The present volume could set any plant lover down this slippery and enchanting incline.

It is a book presenting excellent colour plates and botanical notes on over 500 Victorian plant species and sixteen essays on the flora of selected Victorian regions/habitats. Enjoyment will be found in every aspect. The preface by Professor M. J. Canny, Professor of Botany at Monash University, with its common-sense attitude and advice relating to scientific names, provides a warm welcome to the beginner. The photographs are both beautiful and capable of leading to identification. Their colour may very occasionally be rather artificial but this is a minor point, for in general they charm the reader with their impact and clar-

ity. J. H. Willis's semi-systematic summaries of species provide compact and, it need hardly be said, expert reference information. The essays by G. R. Cochrane are happily ecological in approach and instructive in tone, providing the field naturalist with the knowledge he seeks. A surprising amount of stimulating fact, e.g. "Almost 600 species of vascular plants are known for the Victorian Range alone." (Grampians) is packed into these chapters which deal with such areas, as Box-Ironbark Forests, Heathlands, Fern Gullies, and Rocky Gorges and Escarpments.

It has obviously been very difficult for the authors to decide upon regions/habitats to include, or the terminology to choose in this regard, and it is to be realized that the main emphasis of the book is towards instruction upon our flora, rather than the organization of the botanical ecology of the State. The communities and regions chosen, for example: Saltmarshes, East Gippsland, Swamps Streams and Riverbanks, are ones every field naturalist visits and for which he needs an illustrated reference such as this. Thus a wide coverage of the State's flora is included pictorially, and the index is ample in species reference but would be even better if it were to include Family names as well. A useful glossary of botanical terms is included, also a list of protected plants,—essential information for those who wish to collect even occasional plant specimens, and a timely reminder to all.

The really splendid thing however is the fact that here is a book for Victorians, akin to those provided for British field naturalists long ago; a beautifully illustrated book on our flora, comprehensive enough to be worth-while, and a work of true natural history which will, for many, provide an exciting introduction of botanical delights that await them in the field.

A. R. McEvey.

F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield.

The 116 species known and described, and illustrated by line drawings, and 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis.

This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK, by J. R. Garnet.

Coloured frontispiece, 23 half tone, 100 line drawings of plants and a map. Price $1.50.

Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, Victoria.

Payments should include postage (9c on single copy).

The Amphibian Fauna of Victoria: Two New Records and a Checklist

by A. A. Martin and M. J. Littlejohn*

Introduction

Since Moore's (1961) checklist of the amphibians of Victoria, the following additional anuran taxa have been found to occur in the state: *Hyla maculata* Spencer (Copland, 1961); *Hyla phyllochroa* Günther (Copland, 1962); *Hyla verreauxi verreauxi* Duméril, *Limnodynastes dorsalis dumerili* Peters, and *Limnodynastes dorsalis insularis* Parker (Moore listed only *Limnodynastes dorsalis* Gray) (Littlejohn, 1963); *Hyla aurea aurea* (Lesson), *Hyla jervisiensis* Duméril and Bibron, and *Uperoleia marmorata* Gray (Littlejohn, Martin and Rawlinson, 1963); *Crinia victoriana* Boulenger (Littlejohn and Martin, 1964); *Limnodynastes fletcheri* Boulenger and *Neobatrachus centralis* (Parker) Littlejohn, 1966); *Hyla verreauxi alpina* Fry (Littlejohn, 1967); *Heleioporus australiacus* (Shaw) (Littlejohn and Martin, 1967); and *Mixophyes balbus* Straughan (as *M. fasciolatus* Günther; Littlejohn, 1969; see Straughan, 1968).

The aim of the present paper is to report on the occurrence of two additional anuran taxa in Victoria, and to provide a current checklist of the amphibian fauna of the state.

New Records

Limnodynastes dorsalis interioris Fry.
Specimens collected: 2 miles S. of Bethanga Bridge, and 4 miles N.W. of Koorilla.

Although not recognized by Parker (1940), *L.d. interioris* is clearly separable from *L.d dumerili* on the basis of both adult morphology and mating call structure (Martin, unpublished). The main distribution of *L.d. interioris* is in the Riverina district of New South Wales, and the previous southernmost record is Mirrool Creek, N.S.W. (Fry, 1913).

Uperoleia rugosa (Anderson)
Specimens collected: 4 and 5 miles N.W. of Walwa, Burrowye, 1.5 miles E. of Borrowye, and Talgarno.

Moore (1961), in the most recent review of the genus, synonymized *U. rugosa* with *Uperoleia marmorata*. However, our data indicate that not only are these two taxa distinct, but in addition, that *U. rugosa* actually consists of a complex of two sibling species (Forms A and B of Littlejohn, 1967), which have markedly different mating calls. The above records all refer to Form B (characterized by a long, unpulsed mating call). The previous southernmost record of *U. rugosa* is Urana, N.S.W. (Parker, 1940), but this is almost certainly referable to Form A (characterized by a short, pulsed mating call; Littlejohn, 1967, and unpublished). We have also collected *U. rugosa* (Form B) in the Delegate area, N.S.W. (Littlejohn, 1969), suggesting that it may enter Victoria in East Gippsland as well as in the Upper Murray region.

Checklist of Victorian Amphibia

When the taxa listed in the introduction, together with the two new records reported here, are added to Moore's (1961) list, the state anuran fauna

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totals 35 forms. However, two of Moore's records are almost certainly in error. Firstly, he lists a specimen of *Adelotus brevis* (Günther) from Healesville. We are familiar with *A. brevis* and have never collected it at Healesville or, indeed, anywhere in Victoria. Our southernmost record of this species is near Sydney, N.S.W. Secondly, Moore (1961) lists three specimens of *Hyla citropa* (Tschudi) from Aberfeldy. We are likewise familiar with this species and have no record of it south of Royal National Park, N.S.W. Possibly, as discussed by Copland (1961), the record of *H. citropa* is based on specimens of *H. maculata*. At any rate it seems wise to remove both *A. brevis* and *H. citropa* from the state list. The Victorian anuran fauna then contains the following 32 taxa:

Family: HYLIDAE—

Hyla aurea aurea (Lesson)
Hyla aurea raniformis (Keferstein)
Hyla ewingi Duméril and Bibron
Hyla jervisiensis Duméril and Bibron
Hyla lesueuri Duméril and Bibron
Hyla maculata Spencer
Hyla peroni (Tschudi)
Hyla phyllochroa Günther
Hyla verreauxi verreauxi Dümeril
Hyla verreauxi alpina Fry

Family: LEPTODACTYLIDAE—

Crinia haswelli Fletcher
Crinia laevis (Günther)
Crinia parinsignifera Main
Crinia signifera Girard
Crinia sloanei Littlejohn
Crinia victoriana Boulenger
Heleioporus australiacus (Shaw)
Limnodynastes dorsalis dumerili Peters
Limnodynastes dorsalis insularis Parker
Limnodynastes dorsalis interioris Fry
Limnodynastes fletcheri Boulenger
Limnodynastes peroni Duméril and Bibron
Limnodynastes tasmaniensis Günther
Mixophyes balbus Straughan
Neobatrachus centralis (Parker)
Neobatrachus pictus Peters
Philoria frosti Spencer
Pseudophryne bibroni Günther
Pseudophryne dendyi Lucas
Pseudophryne semimarmorata Lucas
Uperoleia marmorata Gray
Uperoleia rugosa (Andersson)

This list should not be taken as a complete or final one for the state. It is likely that current research in the *Hyla ewingi* complex, *Limnodynastes dorsalis* complex, *Limnodynastes tasmaniensis*, and *Neobatrachus pictus* will reveal the presence of at least four additional taxa. We also consider it extremely probable that *Hyla caerulea* (White) enters the extreme northwestern corner of the state, since Mr. J. N. Hobbs (pers. comm.) has collected it at Dareton, N.S.W., only a quarter of a mile north of the Murray River.

Acknowledgments

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The Future of Naturalists' Clubs

by A. J. Swaby

In the exploration of this old continent and its living things, the F.N.C.V. and others in other states helped very considerably. The pioneering era has almost passed, except in the lower plants and animals. There, much remains to be done and few are doing it—merely in description and classification. Insects and related animals have been described in the adult forms and named. In very many species, however, nothing is known of their life histories. Quite apart from interesting study, these lower creatures are of immense importance to mankind as friends or foes. How do they live? What are they doing? How can we destroy the foe without injury to friend—and to ourselves? What will be the effect on the human race from pollution of air and water?

There will always be nature-lovers coming along to learn what is *known* of plants or animals or rocks, but there should be many, curious enough to explore the *unknown*, or clubs will languish.

What are you investigating?
How can we, the casuals, assist?

* * *

An Astronomical Note for June

The planet Mars is at present on one of its closer journeys from the Earth, and it may be seen quite brightly, and appearing reddish in colour in the eastern sky from about 5.30 p.m. Mars comes closer to the Earth at about 17 year periods.

Jupiter may also be seen now, higher in the northern sky, when viewing Mars.

The Burning Question

(F.N.C.V. Excursion to Daylesford, 16 March '69)

by Edna B. King

At the February general meeting of the F.N.C.V. an address was given by Dr. E. M. H. Ealey of Monash University in which the question of fuel reduction burning in forestry areas was one of the salient points. Because this is a controversial issue and because of the intense interest aroused, an excursion to the Forestry Commission areas in the Daylesford district was arranged.

Six members of the Forests Commission personnel, comprising Mr. D. M. Thompson, Divisional Forester, Ballarat; Mr. I. F. McLaughlin, District Forester, Daylesford; Mr. G. Griffin, Forester, Daylesford; Mr. A. Hodgson, Fire Research Officer, Melbourne; Mr. A. Heislers, Fire Research, Daylesford and Mr. R. Cowley, Management Officer, Ballarat, were on hand to meet the excursion members and guide them on the tour. The rendezvous for lunch was at the Jubilee Lake, Daylesford, and then a sixty mile tour of the forests was undertaken, led by the officials.

Four stops were made to examine the effect of wildfires and fuel reduction burning, recovery of vegetation and allied forestry procedures. Forests Commission personnel gave talks, well illustrated with pictures, maps and graphs on all these aspects, as well as explaining methods of fire control and detailing projects now in hand for flora and fauna surveys.

The first stop was made in the Werona Forest area, where the devastation caused by the wildfire of 8 January was inspected. The conditions prevailing on that day, 100 degrees temperature and high winds, resulted in a very severe wildfire, virtually uncontrollable by the existing fire service, which eliminated 90% of the tree canopy and ground vegetation, along with those animals unable to seek shelter in dams and possibly some birds. Several weeks after the burn, four heavy showers fell, depositing ½ to 1½ inches of rain over the area, causing flash floods, and as there was no ground cover, top soil, organic matter, seeds of wildflowers and low growing shrubs were washed into hollows. This in turn is the beginning of erosion.

The first epicormic shoots on eucalypts appeared approx. 4 weeks after

Eucalypts showing die-back after 1951 and 1962 wildfires. (Langdon's Hill Area)

Photo: Author

Wildfire area in Werona Forest showing 1969 January burn. Note developing epicormic shoots.

Photo: Author

the fire, when the area was visited on 16 March, Poa australis, hibbertias, Thriptomene and acacias were showing vigorous regrowth from rootstocks and rhizomes, although a number of acacia seedlings were found.

The second area visited was Langdon's Hill which had been burned by wildfires in 1951 and 1962. Most of the mature trees showed evidence of "negative increment" or dying back, caused by the destruction of the crown and subsequent development of epicormic buds no longer suppressed by an inhibiting auxin produced in the leaves of the crown. This development of dormant buds ensures the survival of eucalypts after the most severe fires; however, timber from these trees generally is of a degraded nature and unsuitable for commercial purposes. Defects, such as occluded knobs in the stem where epicormic shoots have died off, allowing infection to set in, "dry side" occurring where the cambium has been killed providing a point of entry for boring insects and fungi, and gum veins appearing where bark is damaged, are causes of low quality timber. There was a fairly heavy ground cover of shrubs, mainly thickets of *Acacia mucronata, A. verticillata,* poa and evidence of annuals such as Helichrysum, Vahlenbergia and Craspedia.

The first effects of fuel reduction burning were to be seen at our third stop. This area was control burned in the Spring of 1968 and regeneration of ground cover was well advanced, with climbers (Hardenbergia, Kennedya) Poa, "wire-grass" (*Tetrarrhena juncea*), Lomandra spp., bracken and under shrubs all showing good growth. The orchid commonly known as "parson's bands" (*Eriochilus cucullatus*) was in bloom and fairly plentiful in this area. The tree canopy was not damaged and scorch marks extended 3 to 4 feet up the trees.

The final area visited provided a contrast in that one side of the road had not been burned for approx. 30 years and the other burned in the Spring of 1966. In the long term, fire-free area, trees were mature with heavy foliage at the crown, allowing little light to penetrate, and as a result ground cover consisted of very thick mats of wire-grass, which had almost smothered the few remaining shrubs, mainly Acacia mucronata and an odd eucalypt sapling. On the other hand, the area burned in 1966, had a variety of ground vegetation—shrubs, Poa, Gahnia, etc. and numerous eucalypts saplings.

Fuel reduction burning means the controlled firing of a specific area in ideal conditions, (e.g. after light rain, low winds and high air humidities), so as to reduce the ground litter, comprising leaves, twigs, bark, grasses, etc., to a level where wildfires will not attain high rates of spread and intensity and can be easily controlled. Spot fires are lit simultaneously on a grid pattern, spaced according to prevailing condit-

ions and to ensure that all fires link up at the end of the burning period and are extinguished. Pockets of vegetation are left unburned and an incompletely burned layer of fuel remains, providing shelter and forage for mammals. particularly small, ground-frequenting species. Flames are only about 1 foot high and travel at a pace that allows animals to avoid them. The tree canopy is not damaged and bark only scorched to a degree not harmful to the trees. Eucalypts have thick, heat resistant bark, developed to enable them to survive fires, but the intense heat generated in wildfires can cause severe damage as previously stated in this article.

This program of fire ecology survey has only recently been initiated and Forestry Commission personnel admit that results obtained so far are inconclusive and in some cases theoretical. However, it is known that fires do change habitat rather than destroy it and so species of birds and mammals change in accordance with the habitat. For example, wallabies prefer thickets and when these are converted to open grazing through fires, kangaroos take their place.

The primary purpose of forests is the production of timber for commercial uses, and previously the survival of animal and plant life was of secondary importance. The surveys being undertaken at present are planned to make a broader use of forests from the conservation point of view, due to mounting interest being taken by naturalists and others concerned with research into these matters.

The advantages of fuel reduction burning as put forward by the Forests Commission have been fairly well covered, but a number of questions remain to be considered.
These are—

(a) Fuel reduction burning can harm regenerating trees of an early age.
(b) Nesting sites of some birds (wrens, finches), are reduced by thinning out of vegetation.
(c) Young birds in nests are destroyed because of Spring burning.
(d) Displacement of animals preferring a habitat of thick bushland.
(e) Some unique botanical species could be lost because of repeated fires destroying plants before seeding is completed.

Many naturalists disagree with the principles of fuel reduction burning, however, I am sure all F.N.C.V. members who made this trip regarded it as informative and worthwhile and were most appreciative of the Forests Commission personnel who organized such an interesting tour.

Forest Commission Personnel addressing members in the Werona Forest

Photo: Author

Field Naturalists Club of Victoria

General Meeting 12 May

The hall was filled to capacity when the President opened the meeting and read the apologies. The minutes of the April meeting were taken as read.

New members as listed in the *Vict. Nat.* were then elected.

It was formally moved by Mr. McInnes that Mrs. Misson, a member of the club for over 40 years, be given honorary membership to the club. This was passed and both Mrs. Misson and Mr. R. W. Bond (who had had his honorary bestowed at the April meeting) took receipt of their presentation.

Presentation of the 1968 Natural History Medallion.

Mr. Edmund Gill (Ass. Director National Mus., Pres. Royal Society of Vic.) made the presentation, of the 1968 Natural Hist. Med. to Dr. Norman B. Tindale. In his speech introducing Dr. Tindale, Mr. Edmund Gill, qualifying his use of 'expert' in describing Dr. Tindale, said that he was an expert in the sense of being at the top of his present line of study. He claimed that Dr. Tindale has made his name in two fields of natural history—first as an entomologist and secondly in the field of anthropology. Dr. Tindale in reply remarked that he had worked so long in the field that he was regarding himself as a bit of an 'old fossil', and that the Aborigines nicknamed him 'Chilpy', meaning 'the old fella'. The President thanked all concerned with the Australian Natural History Medallion.

The subject for the evening was on the 700 authentic aboriginal tribes once in Australia, and the address was given by Dr. Tindale. In his youth Dr. Tindale was on an expedition, mapping Groote Island and was given instructions by Sir Baldwin Spencer to 'Collect all information about aborigines in that island'. Dr. Tindale became facinated in the study of Anthropology and went to the University to pursue the study of this subject. He has since been the head of the Anthropology section of the South Australian Museum and held the position until his retirement. Whilst working with the S.A. Mus. Dr. Tindale was asked to write an article for a journal, and upon submitting a map of Arnham Land, showing the tribal boundaries with hard lines, had it returned with the editor's comment, 'Aborigines don't stay in one area; they wander everywhere'. The map was subsequently substituted for one showing only dotted lines, but from this disappointment came Dr. Tindale's conviction that he would someday map the tribal boundaries for the whole of Australia.

Dr. Tindale made it clear in his lecture that the aborigines do observe tribal boundaries which are limited by their mode of travel, walking, and also since the women needed to dig for vegetable food they did not want to encounter unfamiliar food. Food and water then was one reason to limit their boundaries and also since other tribes resented 'strangers' this also influenced their boundary making. Dr. Tindale showed that these boundaries were made in both physiographic and geographic phenomena. Sometimes they were made by actual geographical forms, rivers, mountain ranges etc., but more often a broad area i.e. the boundary set by the distance that could be walked in one day. Usually a tribal area was surrounded by the tribal boundaries of five or six other tribes.

Amongst the aborigines, Dr. Tindale found that they held the family as a very important unit. One of the reasons for this is because the knowledge of the area within a tribal boundary is handed down from father to son, and this knowledge concerning the safest place in time of drought, rains, etc. concerned the safety of the family unit and so emphasized the importance of the unit called a clan.

Another important unit to the aborigine is the "Horde"—this is the extended family group, which is the family plus those families that they exchange women with. These families often come together to form "troupes" or tribal units. The normal size of these tribes are about 500 strong, for if they were any less they could have difficulty in holding their territory if not their natural economy in women. If their troupe was any larger, they would have difficulty in cohesion.

In Australia there were about 700 troupes or tribal units although in Australian literature there may be listed thousands. The reason for this is that where there may be one tribe (called by the name that they identify themselves

with) all the other tribes around about may have several different names for that one same tribe.

Dr. Tindale claimed that the aborigines came to Australia over 30,000 years ago from Asia, after surviving a sea voyage. He said this was during the ice-age when so much of the sea was taken up with ice and the water level was 300 feet lower than at present, and there was dry land to New Guinea and Tasmania was attached to the mainland.

Dr. Tindale said there are three different types of aborigines in Australia, the Barrineans, the Murrayians and the Carpenterians.

Talking about the aboriginal way of life, Dr. Tindale stated that the men spend most of their time hunting, whilst the women collect vegetable seeds. Food in any one small area is soon exhausted and they must then move on to a new place. As a result of these movements tracks evolved.

Next, Dr. Tindale talked about the camping sights of the aborigines. He said that when choosing a camping sight, they took into consideration that the sand must be warm, and there must be sufficient visibility as well as having water and firewood and being able to provide shelter.

When talking about one of their most important commodities, water, Dr. Tindale said that many aborigines depend completely on rock-holes. They are commonly referred to as rock-holers and are the most nomadic. They are, because of their precarious position considered dangerous and are despised by many of the other tribes.

The food of the aborigine depends completely upon the providence of his territory. Some use grass seeds to make a diet which consists completely of a kind of bread which they are able to make. So the more fortunate tribes who can hunt for their food generally despise these people, calling them "dun eaters". Dr. Tindale pointed out that the teeth of the hunting tribes are far superior to those of the "dun eaters" as a result of their different diets. Some eat the flower, seed pods, stems and roots of the water-lily. Whilst other tribes have as a basic food, lizards, which when caught are killed and put under a "string belt" until the whole belt is filled. Other tribesmen may feed on the turkey bustard and the emu, catching them after herding them to their water-hole which they have poisoned.

A very important commodity to the economic life of the aborigine is that of chert and flint-stones, which make good cutting instruments. There were also other very important areas of economic value to the aborigine that grew wood for spears. Also resin from Yaka and grass trees which was melted down to make handles for knives and other instruments. These important areas were often personal possessions of a tribe and these commodities were used for trade.

Nature Notes and Exhibits—Mr. W. Woollard showed his prototype of an improvement on the Victorian Naturalist microscope, and welcomes interest from people wishing to build their own.

Mr. A. J. Swaby exhibited the tent shelter of the Turret Spider—constructed mainly from the flower stalks of the garden geranium *Pelargonium zonale*. Also from Mr. Swaby were two specimens of "lily"—*Calostemma luteum* (Yellow Garland Lily), and *Crinum flaccidum* (Murray lily). The shoot from the latter seed could be seen to have entered the soil to form the bulb. On the bean shoot, the leaves had grown, and from there will come the stem. He concluded by saying that at this stage the plant should be potted.

R. Condron exhibited a specimen of the Long-haired Grasshopper from the summit of Mt. Donna Buang; and also some phasmatids (*Didymuria violescens*) which appeared in plague proportion in the Powelltown district earlier this year. They were combated by aerial spraying.

Alan Morrison showed what was thought to be the egg casing of a shark. It was found on the beach at Cape Liptrap in April.

Geology Report, 5 March

Thirty-two members and visitors attended. The speaker on the occasion was the Chairman, Mr. Davidson, who gave an account of a journey through most of the western half of the continent. His talk was supported by a large number of slides of Geological formations taken during the trip, in which a Landrover was used as transport. The route was through Wilpena to Mt. Painter, where Torbenite was collected from the pre-Cambrian rocks, up to the Opal mining areas of Andamooka and Coober Pedy, then on to Ayer's Rock and the Olgas. Mention was made to the hardness of the Conglomerate of the Olgas, and the large size of some of the

boulders in it. A visit was made to the Henbury meteor crater near the Finke River; then up to Hart's Range, Tennant's Creek and across to Katherine Gorge, which the speaker said was cut in Devonian limestone. The journey then proceeded west to Derby, Broome, and on to Marble Bar, where excellent slides were taken of the banded Jasper. On to Port Hedland where things were happenin a big way. Iron ore from Mt. Newman is being railed on a specially constructed line to the port for transport to Japan. A visit was then made to the Blue Asbestos area at Wittenoom Gorge. The journey then continued to Meekathara, Mt. Magnet, Kalgoorlie, Mt. Monger and Coolgardie. In these highly mineralized areas a large variety of specimens was obtained. Next stop was at Kambalda which the speaker said was another boom area. He said that prospecting and drilling parties were everywhere in search of Nickel. A visit was made to the famous Wave Rock at Hyden, and slides were shown of this. Other places visited before the journey home were Esperance, Ravensthorpe and Norseman, and further collections were made. Mr. Davidson's excellent slides and commentary were appreciated by all who attended.

Botany Group Meeting

8 May 1969.

Twenty-three members and friends were present with Mr. Fairhall in the Chair. The speaker for the evening was Mr. Robert King, whose subject was "Marine Botany", Mr. King gave a general account of plant ecology in the marine environment and this was illustrated with excellent slides. Particular reference was made to the algal communities of the rock platforms in the Point Lonsdale area where Mr. King, with Mrs. Ducker and botany students from Melbourne University, have been carrying out botanical research over recent years. Mr. King described the Point Lonsdale algal flora as probably the richest on the Australian coast. Well over 400 species of algae have been recorded from the area, as well as three marine angiosperms.

The well defined zonation of algal communities was described and illustrated. This zonation corresponds to the relative exposure to seawater, and air and sun between the high and low tide limits, and those belts of marine growth just above and below the tide limits. Sometimes the zonation is classified according to predominant species present, for example Horomosira zone, Cystophora zone, Durvillia zone, or according to high and low water extremes—above high water being termed *supra littoral*, followed by *littoral, lower littoral.*

Seasonal variations in the algal species present were illustrated and explained, and a number of common species also discussed with the aid of slides.

Genera illustrated included Gaulerpa, Codium, Chaetomorpha, Hormosira, Ecklonia, Macrocystis, Cystophora, Perithalia and Metagonolithow.

A most interesting talk was concluded with questions from members. The Chairman moved a vote of thanks to Mr. King, and members carried this with enthusiastic acclamation.

An excursion was arranged for Sunday, 8 June combining with the Preston Juniors under the leadership of Mr. Fuhrer. This will be a Fungus excursion and the meeting place is Fern Tree Gully station at 11 a.m.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9 June—Annual Meeting at National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for evening—"Some familiar plants of the family Myrtaceae". Miss M. Lester.
4. New Members
   (a) *Ordinary:*
   Miss Marion Blair, 647 Punt Road, South Yarra 3141. (Interest: Botany.)
   Miss Ann Forbes, 9 Hallow Street, South Oakleigh.
   (b) *Joint Ordinary:*
   Mr. and Mrs. B. M. Hall, 464 Glen Eira Road, Caulfield, 3162.
   (c) *Joint Country:*
   Miss Wendy M. Kroker, "Kia Ora", Horsham, 3400.
5. General Business.
6. Nature Notes and Exhibits.

Monday, 14 July—"Field Trips in South Africa". Mr. R. McLister.

Group Meetings

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 12 June—Botany Group, "Orchids" by Miss C. E. Gray.
Friday, 13 June—Montmorency District Junior F.N.C.
Wednesday, 18 June—Microscopical Group.
Friday, 27 June—Junior Meeting at 8 p.m. at Hawthorn Town Hall.
Wednesday, 2 July—Geology Group.
Thursday, 3 July—Mammal Survey Group. Meeting is held in Fisheries and Wildlife Dept. Library rooms at 7.45 p.m., Flinders St., Extension.
Friday, 4 July—Junior Meeting at 8 p.m. in Rechabite Hall, 251 High St., Preston.
Monday, 7 July—Entomology and Marine Biology Group.
Thursday, 10 July—Botany Group.
Friday, 11 July—Montmorency District Junior F.N.C.

F.N.C.V. Excursions

Sunday, 15 June—Creswick: Leader Mr. J. H. Willis, Fungi and General. The coach will leave Batman Avenue at 9.30 a.m. Fare $2.00. Bring two meals.

29 August-21 September—Western Australia. The party will leave by the evening train on Friday, 29 August and arrive in Perth 7 a.m. Monday 1 September. A coach will meet the train and will go to Jurier Bay for the first night, then on to Northampton for the four nights following, with day trips to Kalbarrie etc., The party will then go south, staying overnight at Geraldton, Wongan Hills, Merredin and Lake Grace visiting Wave Rock on route, and the Porongurup, Albany via Stirling Ranges (two nights), Manjimup, Busselton (two nights) with day trip to Augusta, Perth (two nights) with optional excursion to Rottnest Island on Wednesday. The train will leave Perth on Thursday evening and arrive in Melbourne on Sunday morning, 21 September. Accommodation is mainly on a dinner, bed and breakfast basis, and cost of the excursion is $260.00 including deposit of $50.00 paid when booking. The balance should be paid before 1 August, and those members who have requested a sleeping berth between Melbourne and Adelaide should include the extra $13.50. All cheques to be made out to Excursion Trust, and sent to Miss M. Allender, 19 Hawthorn Avenue, North Caulfield 3161. Members have until the end of July to pay, but it would assist the excursion secretary if the bulk of the payments were made by the July general meeting. At time of writing there has been a double cancellation, so two seats are available. The excursion secretary would be pleased to receive advice of items of natural history interest along the route, and hopes Western Australian Naturalists in these areas will contact the party, and where possible, spend some time with the excursion.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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Photo: Ken G. Simpson

Weekend Kangaroo shooters killing for dog-meat and pocket money dumped the heads, tails, paws and entrails of these Grey Kangaroos (*Macropus giganteus*) beside a highway in Southern central Queensland.

Many similar sights may be seen in other inland areas of eastern Australia, due to the onslaught of unlicensed weekend shooters. Much wilful damage to roadside properties is also done by these irresponsibles who, failing in the prime object, shoot at anything on sight.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

F.N.C.V.

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The photograph of newly-weaned Elephant Seal pups was taken by J. Bèchervaise at Heard sland.

Rearing Orphaned Ringtail Possums in Captivity

by John Goode

Illustrations by Author

With very few exceptions, it is illegal in Victoria for any private individual to capture or retain in captivity, any species of marsupial.

However, there are occasions when young possums are found separated from their mothers in the wild. Ordinarily they would die from exposure or starvation. Similarly, lack of information on techniques of foster care can result in their death.

I became interested in rearing ringtail possums when my eldest son found one and brought it home in his shirt pocket. Before that time, I had been interested in rearing other kinds of animals and had been greatly helped in this work by research workers in several Universities. Therefore, when this possum came into my possession, and I expressed interest in techniques for rearing them, the Fisheries and Wildlife Department of Victoria granted permission for them to be kept while observations could be carried out.

My son found the baby on the ground among some tea-tree scrub on the outskirts of Frankston. When he brought it home, the baby was still considerably nervous and frequently uttered a "high-pitched chirruping twitter . . . used by juveniles of post-pouch age when they have become separated from their mother" (Thomson and Owen 1964).

As the baby seemed happiest in my son's shirt pocket, we decided that possibly it received some warmth from his body and perhaps some semblance of the security of its former parent-young relationship. When the possum no longer chirruped, I thought this had been achieved, especially when the pocket pouch was substituted by another resting on a hot water bag.

Within 24 hours of the baby arriving, it began to accept food and we attempted to feed it warm fresh cow's milk with a largish eye dropper. This was unsuccessful, but the baby readily accepted sweet apple which it ate greedily.

After more unsuccessful attempts to persuade it to take milk from a dropper, or lap from a saucer, its main diet became apple with the offer of a few native flowers and buds and a few exotic flowers from the garden. To provide liquid, we sprayed the leaves and buds with warm water.

For about a week, the baby possum appeared to thrive and became tame. Then one afternoon, without warning or any preliminary symptoms, it appeared to suffer a fit. Within a minute it was paralysed and prostrate; within an hour it was dead. Earlier in the day, it had playfully scampered about the room, had jumped naturally from chair to chair, and had given no indication of any impending illness.

However, subsequent inquiries revealed that with young ringtail possums in captivity, such unpremeditated deaths are common.

After talking to various people used to handling marsupials, I deduced that one or all of the following factors could have influenced the death:

Author's son feeding baby Ringtail, when quite young.

i. Insufficient heat
ii. Inadequate and unsuitable feed-appliance
iii. Incorrect milk diet
iv. (after rearing several other specimens) what may be the most significant of all factors—the subconscious fear of young, newly orphaned ringtails, and its likely influence on their feeding.

For the future, I therefore worked out the following techniques. Firstly, at all times young orphaned ringtails would be provided for at least a week, or longer if the weather was cold, with a hot water bag against the pyjama sleeve (tied at one end) which we used as a substitute pouch; and the cage was always kept in a heated or sun-warmed room.

The nearest approximation to a marsupial teat is a length of bicycle tube valve rubber, about 1½ inches long, and we used this in conjunction with a set of plastic doll's feeding bottles, each containing about 5cc of liquid. For its first feeds, we found that one bottle was enough. As the possum grew larger, two or more bottles could be prepared and kept warm in hot water. Always, the possum was fed as much at it would take.

There is a growing amount of evidence that some constituents of fresh cow's milk are not readily digested by marsupials and a mixture of one part of tinned evaporated milk with two parts of boiled water was devised. This has been fed to all the ringtails we have reared and we have increased the quantity of milk to water, to 50-50 as the ringtails grew older. Fresh cow's milk is never offered in their diet.

With every ringtail we have reared, each has initially been disinclined to accept milk or any other liquid. We therefore devised a technique whereby, from the time a baby is received, it is carried around during the waking hours inside a shirt pocket of one of our children and the shirt in turn is covered by a pullover. By allowing only one child to nurse a possum at this stage, my theory is that he becomes "imprinted" on the baby as its foster parent and I believe that *rap-*

Second of author's sons demonstrating technique of feeding young possum.

port is established very quickly in this manner.

With every possum we have had, the first few feeds have always been rejected either when the possum was offered a bottle with a valve-rubber teat, or its nose was lowered into a small container of milk mixture.

However, within six hours of the youngster's arrival, we ensure that at least 5 cc of milk mixture are fed by the bottle. This usually has to be done by inserting the "teat" into the side of its mouth and squeezing a drop or two at a time into the mouth.

I believe that for some time it is advisable to feed the milk only by bottle and teat, even though the possum may be able to lap. By maintaining at least one bottle feed a day, it consolidates the feeling of security and the possum—foster parent relationship, both seeming to be vital factors in the successful rearing of young ringtail possums.

Troughton wrote that in captivity, "ringtails will take almost any vegetable or fruit". From my experience in rearing young tortoises, I decided on a regimen of foods which were as close as possible to those which a young ringtail would find in its natural habitat. At Frankston, this is convenient as it is in the Mornington Peninsula "coastal scrub" zone. In the area of our home, there is still much virgin flora with a preponderance of native tea-tree and coastal manna

Portrait of baby Ringtail possum.

gum. In the right seasons, we also have at least three varieties of acacia and a multitude of flowering native shrubs, including heath, thriptomene, bacon and egg flowers and many others.

Also fuschias, almond blossom, balsam and roses were offered if there were not too many native wild flowers and if the young ringtail was considered old enough to be able to digest them.

Often, young ringtails have been able to take milk mixture from a stainless steel ashtray (ideal for sterilizing) within three days of their arrival, and from their arrival we have always offered them a variety of native blossoms and shoots available in the nearby bush. The varieties depend on the season, because possums have been found both in September and in December-January.

Perhaps, understandably, it has always been advisable to offer a variety of native plants to these youngsters and also to older specimens. Individuals have shown distinct preferences for various types of plants, but they do not maintain interest in the plants they may at first prefer.

For example, one possum consistently refused to touch the flowers of the queen or early black wattle which is exotic in Frankston, but would readily eat the three species of local wattles when they were available. Always, young shoots of tea-tree were acceptable.

If their cage is sufficiently large, or if permitted to eat and drink outside their cage, ringtails will keep their pouch and its surrounds reasonably clean. Outside the cage, they can be trained to perform their toilet on a piece of newspaper. To counter the rather strong smell of their urine, fresh sawdust, frequently changed, has been found to act as an excellent deodorizer and absorbent substance to use on the floor of the cage.

Despite references in earlier literature to the dislike of these nocturnal animals to strong light, young possums are very active by day and night in captivity. They do not seem to mind indirect sunlight, or romping in a room well lit by electric lights.

From about three months after they have taken regular quantities of solid food, small quantities of non-acid fruit and salad vegetables may be introduced to the young ringtail's diet. Initially a small slice of apple may be offered, or a little ripe (or over ripe) banana, some lettuce and some celery leaves.

As they grow larger, the quantities may be increased and sunflower seeds and dried oatmeal will also be taken.

When older, young ringtails will fearlessly steal strawberries which they enjoy.

At all times, these exotics should be considered as supplementary and the bulk of solid food should be native leaves and flowers.

Morsels of bread smeared with honey are popular, and in time the milk and water may be replaced with five ounces of warm water to which half an ounce of honey has been added and dissolved.

In the wild, Troughton alleged that ringtails have an extremely quarrelsome nature, although later writers have considered them remarkably gregarious.

With ours, aggressive tendencies have been noticed only in one female. Now adult, she was reared from little more than 4 oz. weight and had the run of the house.

When a new youngster, a male in a rat's cage, was brought to us, she heard it chattering and jumped on the cage. Had she not been restrained, she would have attacked and injured the newcomer. At the time we thought this was strange, but later, it seemed that while one might have thought the frightened baby would have appealed to her maternal instincts, it seems that instead, she considered it an intruder into her exclusive territory.

These observations and our successes are only nominal, but the methods described for rearing youngsters have worked in every case except the first. There are now quite a few possums living in the wilds of undeveloped Frankston, which we reared until they were large enough to fend for themselves.

During the course of having possums around the house for several years, it is not possible to think of them without forming impressions on their behaviour, no matter how unscientific their foundation.

Troughton described the behaviour of ringtails in captivity as showing "pronounced stupidity", while Wood-Jones said they had "unintelligent simplicity".

We have found that in a household of five people, an orphan ringtail will respond to handling from any member of the family, but will escape from any visitor. However, possibly through their keen vibrissae and perhaps their sense of smell, captive possums certainly show constant preference for their "foster parent" in whose care they always seem much more comfortable, even when they have long passed their juvenile phase.

Acknowledgements

I am deeply indebted to Mrs. Elizabeth Wallace, of Tranmere, South Australia, for information she supplied; and also to officers of the Fisheries and Wildlife Department of Victoria, especially Mr. John Seebeck who initially gave me clues which put me on the right track regarding their care in captivity; and to Mr. Keith Dempster who gave me essential advice regarding the preparation of this account, and was helpful in many other ways. Dr. J. A. Thomson kindly provided reprints of his own papers. Thanks are also due to Mr. T. Rendell, animal technician, Department of Physiology, Monash University, who was also very helpful.

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Bright Days in Birdland

by A. H. Chisholm

What an Australian poet has termed "the clamant life of Spring" was exceptionally potent in most parts of south-eastern Australia during October-November 1968.

Driving through the sub-interior southward from Sydney in mid-October, fringing a lush countryside, I heard everywhere the "wich-a-poo" shouting of Rufous Songlarks and the resonant singing of White-winged Trillers and Rufous Whistlers; and in the Maryborough district of Central Victoria, where I spent several weeks, birds were so numerous and in such good heart that more than 40 species were found breeding.

In one small area alone, the secluded, well-grassed, and tree-girt homestead paddock of Bob Scott, apiarist and conservationist, nests of some 15 species were "laid on": among them being three of the cleverly-hidden chambers of the Rufous Songlark and one of a Little Cuckoo-shrike in an unusual setting—the branch of an introduced pepperina.

Both forested and open areas of the district produced many birds, but, rather curiously, some familiar kinds were either absent or in short supply. Thus, we saw very few examples of the Yellow Robin (or of the Hooded and Red-capped Robins); in the absence of bloom on eucalypts, probably due to the preceding drought, both the common Yellow-tufted and Fuscous Honeyeaters were rare; we neither saw nor heard the berry-eating Painted Honeyeater; and, to our surprise, we failed to find any White-faced Chats.

On the other hand, the expanses of trees and bushes and shrubs immediately north of the town gave us nests of two very charming singers of the sub-interior, the Crested Bellbird and the Gilbert Whistler, and among additional experiences of consequence were the gaining of two new breeding records for the district and the sight of another species rarely seen there.

In the first place, while Eric Du Bourg was photographing at a Bellbird's nest he was astonished to see a beautiful male Crimson Chat flit into view and then go to a nest in a foot-high shrub. Later, 11 other such nests were found (mainly by Lyle Courtney) in the same general area, each being a fibrous cup placed in a small bush pea, *Pultenaea laxiflora*; and later again we learned that this bird of the interior, presumably responding to certain climatic factors, had "exploded" into various parts of southern New South Wales and northern Victoria.

Our Maryborough record was, apparently, the farthest point southward.

Aside from the irruption itself, what astonished me was the fact that the Crimson Chats, normally birds of open spaces, had adopted an area well endowed with ironbark and box trees and bushy growths; and I could only suppose that they had spied out the spot for nesting purposes and chosen it because of its liberal sprinkling of the small pea-bushes. Moreover I was surprised at times by seeing a male bird, after gathering food on the ground and taking it to nestlings, fly aloft 20 feet or so and perch on a tree-branch, there proclaiming its feat with a quaint little "Ting".

Of the 12 nests found, two contained three eggs and the others two each. Most of the young emerged safely; one exception was a nestling which thrust its head through the side of a nest and so, being unable to withdraw, virtually committed suicide. Each young bird, sightless for several days, was flesh-coloured, with an orange gape, and at a quite early stage had a red spot on the rump.

Both adult birds were very attentive to the eggs and young, and when alarmed both were apt to give exhibitions of the "broken-wing trick": a practice which is much favoured by nesting White-faced Chats.

All of the beautiful wanderers vanished the local scene, I am told, before the end of December, presumably taking the young along with them up into the interior. They had been in the Maryborough forest for, perhaps, about two months, and in that time had given much pleasure to numbers of residents.

No less impressive than the presence of the Crimson Chats was the discovery in two instances, in the same area, of an egg of the Black-eared Cuckoo in a nest of the White-browed Babbler.

When, early in November, I took for casual examination two eggs from a Babbler's nest six feet up in a bushy eucalypt, I was surprised to find that one was the dark-red egg of the Cuckoo. That egg much interested local naturalists, and so, later, did the forbidding appearance of the young Cuckoo—blackish, broad-backed, and with strong barbs on the wings.

We were all impressed, too, by the fact that the young interloper, while still sightless and featherless, ejected the young Babbler (whose body was found on the ground below) by throwing it over a two-inch ledge at the nest-entrance. That was, indeed, a remarkable feat.

Meanwhile, one of the Maryborough men, Ted Rich, found another egg of the Black-eared Cuckoo with a Babbler's egg in a nest half a mile or so away. (Normally he would not have troubled to examine those eggs, but was moved to do so by the earlier discovery.) In this case, however, no hatching occurred, for a predator of some kind took both eggs. Predation, too, put an end to the young Cuckoo in the first nest.

These two instances are, as far as I know, the only records of the Black-eared Cuckoo imposing on the White-browed Babbler. Its chief host is the Speckled Warbler, with whose dark-red eggs (laid in a nest on the ground) it finds striking harmony in both colour and size. Curiously, although both of these birds (Cuckoo and Warbler) have only rarely been observed in the Maryborough district, a small company of the little speckled birds of the forest floor was seen, though no nests were located, in the area where the Cuckoo's eggs were found.

Was that occurrence, I wonder, merely coincidence? Or did the Cuckoo spy upon the Warblers and, failing to find them breeding, do the next best thing by adopting the Babblers?

One other fragment of special interest noted near Maryborough in November was that a pair of the little Whitefaces appeared to cover their eggs with feathers each time they left the hollow stump containing the nest. I have since been informed that the Spine-billed Honeyeater, which builds an open nest in a bush, sometimes acts in similar fashion. Can any evidence on this point be offered?

Preliminary Notes on Some Short-necked Tortoises from Eastern New South Wales

by JOHN CANN*

Relatively little information has been published on short-necked tortoises in the genus *Emydura* found in New South Wales east of the Great Dividing Range. Worrell (1963) specifies no species for this area, while Goode (1967) states that only the species *Emydura krefftii* is found in this area, and then only as far south as Kempsey (latitude 31°5′ south).

The population described would appear to be geographically isolated from short-necked tortoises of *Emydura* described from eastern coastal Queensland, and from those of the Murray - Darling - Macquarie Rivers west of the Great Divide. At present, the extent of the population described would seem to be bounded in the west by the Great Dividing Range, and in the north by the Ebor River (latitude 30°25′ S) and in the south it extends to the Shoalhaven River (approx. 35°S).

Taxonomically, this tortoise has yet to be described and its status and phylogeny determined, and this paper is confined to observations on some aspects of its behaviour and on the comparison of its eggs and hatchlings with those of some other chelid tortoises.

Most of the observations of these tortoises have been made in the Macleay River, N.S.W., where they have been studied both by skin diving and by other methods. To date, more than 300 tortoises have been marked and catalogued and observations are continuing.

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Thermoregulation

On 23 May, 1968 and on 7 July, 1968, water temperatures were recorded at 7°C and 5°C respectively. On both occasions large numbers of these tortoises were observed to be active, which would appear to indicate that they do not hibernate at these temperatures.

"Conjugal Fidelity"

Early observations in 1968 indicated that often, male and female tortoises swam together and subsequent marking of such pairs showed that with one pair marked, they were still swimming together two months after marking. At times, up to eight or ten "pairs" of tortoises have been seen swimming together.

With this population, there appears to be clear sexual dimorphism in the carapace of males and females, which seem to show consistent differences as shown (Pl. 1).

As pairing has been noted at different times of the year, it would appear that this phenomenon is not confined to the possible courtship period and further observations will be made on this aspect of their behaviour.

The size of mature specimens of this group is conspicuously smaller than that known for *Emydura macquari* as may be seen from Pl. 2, with a carapace length of 6·0-6·5 ins (153-165 mm) appearing to be the largest attained by most adults.

Nesting and Incubation

To date, eggs of this new group

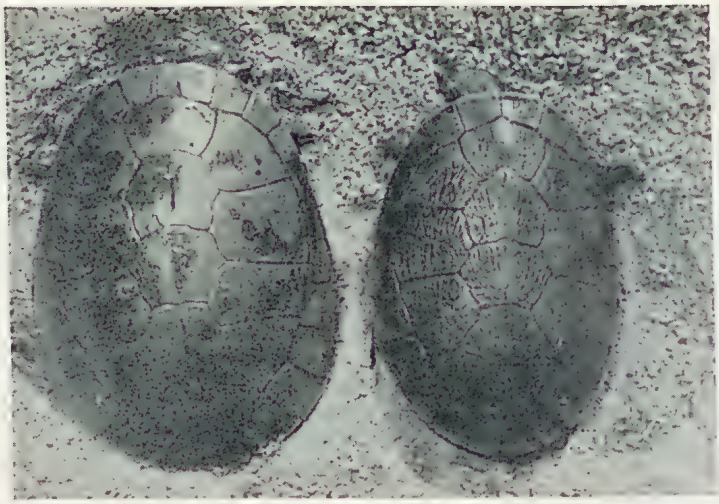

Plate 1.

Eastern N.S.W. *Emydura* sp.

♀ (Female) ♂ (Male)

have been found in only two nests. A typical egg and hatchling are shown in Pl. 3, where the egg had a length of 1·44 ins (36·51 mm) and a cross-section diameter of 0·7 ins (17·85 mm). The young from this nest hatched on 2 February, 1969, and had a carapace length and breadth respectively of 1·11 and 0·905 ins (28·17 and 23 mm). These specimens have been preserved and are now in the collection of the Australian Museum, Sydney.

Differences have been observed between eggs and hatchlings of the eastern N.S.W. *Emydura* sp. and those of *E. macquari* (Pl. 4). However, Goode (personal communication, 1969) states that even within a single species, a wide range of egg shapes and dimensions may be noted, and also between hatchling sizes from a single clutch of eggs.

Eggs of five types of chelid tortoises are shown in Pl. 5. They are from left to right, the long-necked

Plate 2.

Left—*Emydura* sp. from Eastern N.S.W.
Right—*Emydura macquari*.

Chelodina expansa, short-necked *E. krefftii, E. macquari* and the *Emydura* from eastern N.S.W., and the long-necked *C. longicollis.*

Conclusions

Much further work needs to be devoted to this geographically isolated group of emydurid tortoises from eastern N.S.W. and this is now in progress. Work on their taxonomy and on other aspects will continue and will be published when results are available. At this time, it would appear that the group has been isolated for some considerable period, and while it is not known whether or not it is reproductively isolated from adjoining species of *Emydura,* its small size and the noted differences in egg shape and dimensions, and in hatchlings, would seem to be significant.

Acknowledgements

I am grateful to Mr. John Goode for his advice regarding particular aspects of this investigation and for his suggestions on the editing of this paper.

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Plate 3.

Plate 4.

Plate 5.

FNCV Grampians Excursion, September, 1968

by J. A. Baines

Part 2

Wednesday, 4 September—Wonderland trip.

The famous tourist walk is also of much interest to the naturalist, who, just as he prefers geological explanations to the fanciful names given to the formations in limestone caves, is more interested in the geology, botany and entomology than in the comparative implications of such names of features as Grand Canyon, Negro's Head, The Flat-iron, Sphinx Rock, Whale's Mouth, Cool Chamber, Echo Cave and Wall of China, not to mention Silent Street, Lady's Hat, the Cross and Fallen Giant. Plant species of special interest included *Trymalium d'altonii, Prostanthera lasianthos*, and *Phebalium bilobum*. A Mallee visitor of 1940 with the appropriate name Overall had left a visible reminder of his visit in huge letters on the rock of Echo Cave. (We saw the ultimate of this practice, much deplored by naturalists and conservationists, on the Sister Rocks near Stawell on our homeward journey.)

The Grampian Mountains, so named by Sir Thomas Mitchell after their namesake in the Highlands of his native Scotland, have been formed as a result of differential erosion of folded sandstones of upper Devonian and lower Carboniferous origin. The sediments are predominantly of freshwater origin, though it is probable that, in Miocene times, the Grampians formed a large promontory which jutted out into the shallow sea that occupied the Murray Basin. The sandstones have, in places, been intruded by porphyritic sills and dykes, and by granitic batholiths. Some remarkable rock formations exist, such as the Nerve Test, which no members of our group were prepared to negotiate fully, although the writer remembers the nonchalance with which the late Gilbert Rogers used to demonstrate this in the thirties. The spectacular Wonderland Forest Park has been set aside and managed by the Forests Commission under the provisions of the Forest Act, 1958.

From the Pinnacle, with views of the Mt. Difficult Range, Relph, Mackey's and Bellfield Peaks and of the new Lake Bellfield and Hall's Gap, the track led down to the Sundial turntable for us to rejoin the bus, after noticing in the Stone Kingdom area an endemic boronia (*B. latipinna*), *Correa aemula* in flower, and the fascinating Grampians endemic Bristly Trigger-plant (*Stylidium soboliferum*), with vivid green rosettes and flowering stem only three inches high (not yet in flower, unfortunately, but they are creamy-pink inside and dark red externally). Lunch was taken fairly close to Mushroom Rock. A walk up to Sundial Peak followed, where Gang-gang Cockatoos and a Pied Currawong were seen, and the Grampians endemic parrot-pea, *Dillwynia oreodoxa*, among other interesting plants. From the Sundial lookout there is a fine view over Lakes Bellfield, Fyans and Lonsdale, and over to Mt. William (with the winding road we had traversed earlier) and the Major Mitchell Plateau (which has been described in the *Vict. Nat.* by Ian

McCann), and a near view of Mt. Rosea, which has a natural stairway on its face. On the way down some bushes of Grampians Heath were much taller than a man.

On the way back to the guest house a call was made at "Belbra" nursery for native plants, kept by the Stantons (Mrs. Stanton was a D'Alton). Many members of the F.N.C.V. party, including some who are keen members of the Society for Growing Australian Plants, bought plants. There were species from all Australian states—South Australia's *Acacia iteaphylla* and N.S.W.'s *A. cardiophylla* (Gawler Wattle and Wyalong Wattle) were noticed, and our own Gold-dust Wattle (*A. acinacea*) was represented by the finest flowering specimen of it any of us had ever seen.

Thursday, 5 September—Black Range and Bunjil's Cave.

The story of Bunjil's Cave has been told (*Victorian Naturalist* **74**, 2), and it is most interesting with its record of the original red-ochre-using Buandik tribe, the later white pipe-clay-using Jardwa people from the north, and the impact on the latter of the red-coated soldiery of the early colonial days. Its discovery was belated, mainly because of the confusion of the two Black Ranges. Is it too late to re-name one of them? This range near Stawell could be given a distinctive aboriginal name. (At the same time, why not give the Mt. William near Lancefield the name of the aboriginal tribe who conducted their quarrying activities there, thus distinguishing it from the much higher Mt. William of the Grampians?) Granite boulders outcrop here in profusion, so it was not surprising to find Rock Fern (*Cheilanthes tenuifolia*) covering large areas in parsley-like masses, while also plentiful were Morels (*Morchella conica*) and Scented Sundew.

The White-faced Chat is sometimes called a Nun, but four nuns not in the bird class were fellow visitors at this time. It was pleasing to find these dedicated women so obviously interested in the geology, ethnology and botany of the area, and also in photography.

In search of the recently discovered aboriginal quarry in the Bellellen district, we were temporarily lost in the Gluepot vicinity, and called at a house to seek information. The owner, Miss Heather Hately, put us on the right track, but, before we left, she gave us the privilege of entering the native tree plantation that had been established by her late father, Mr. Garnet Hately, uncle of Keith Hately of Kiata Lowan Sanctuary. A great variety of shrubs and trees from all parts of Australia, especially eucalypts from Western Australia with their remarkable fruits and differing habits of growth were still doing well, while others obviously needed thinning out, with removal of dead branches. Perhaps the local naturalists could persuade Miss Hately to allow them to help in the restoration and preservation of this unique plantation. Bird observers spent some time watching a Yellow-winged Honeyeater, and also Grey Fantails performing the aerial evolutions that earn them the nickname "Cranky Fan".

The aboriginal quarry rocks were reached after a walk across a sheep paddock, and there were signs of flaked-off artefacts. We then proceeded to our lunch spot at Kelley's Bank beach on the shore of Lake Fyans. This reservoir, of 17,100 acre feet, was completed in 1916, and is part of the great Wimmera-Mallee stock and domestic water supply scheme, the largest of its kind in the world. It is marked on some printed maps nowadays "Lake Fyan", which does a disservice to the memory of Foster Fyans,

who, like Mitchell, served in the Peninsular War, and who, while magistrate at Geelong, when Lonsdale was serving in a similar capacity at Melbourne (Fyansford bears his name in that district), wrote at length of the aborigines, and of the opening up by the squatters of the Western District. Binoculars brought into focus many water birds perching on dead trees projecting from the water, or swimming on the surface. There is some totally prohibited water, but unrestricted boating is permitted on part of the lake. Stawell Yacht Club has a club house, and there is a pump-house for Ararat Water Supply. Mountain Ducks, Black Swans and two Whistling Eagles were observed in a lagoon area nearby.

On return to Hall's Gap, some of us walked up the Clematis Falls track. The writer was first to notice a large koala perched in a comparatively low tea-tree, and the lovable creature soon had a circle of admirers, photographing him or just marvelling at his unconcern, with no fewer than 18 humans coming so close. An unusual feature was the very light colour of the neck fur compared with that of the rest of the body.

This was stringybark and grass-tree country, with some box, peppermint and Manna Gum. The track was very damp, hence the presence of Yellow Marsh-flower (*Villarsia exaltata*) (now to be called *V. reniformis*?). Somehow we missed a turn-off, and the terminal forks of the track we followed did *not* bring us to the falls. (A few later successfully attained the goal on a pre-breakfast walk.)

At night in the Hall's Gap hall a programme of slides was shown for the benefit of all visitors, in aid of Stawell F.N.C.'s fund to buy fencing wire for their sanctuaries, and of course we all went. Slides and commentary were by Ian McCann, with projection by Neil Bennett. Grampians scenes, mammals, birds, flowers (including orchids), reptiles, spiders, millipedes, etc. and aboriginal sites made up a varied programme. One slide was of Snow Gum, found only on Major Mitchell Plateau, as far as the Grampians are concerned.

After return to Grampians House, many of us enjoyed a long discussion with artist Neil Douglas, who had set up a studio to paint our native wildflowers not as isolated individual specimens, as has been done by many artists, but in their ecological setting; this, he felt, would express the spirit of our bush more authentically, and he regarded his work as all the more important because so much of the "primitive" aspect was disappearing with the destruction or spoliation of a great deal of our truly Australian environment. The talk finished with discussion of the controversial struggle he is having with the Education Department (at least two of his hearers were headmasters!). Some samples of his work were generally approved when a later invitation to his studio was accepted.

Friday, 6 September—Reed's Lookout, McKenzie Falls, and Mt. Victory.

Past the turn-off to Chautauqua Peak, one was set wondering how a mountain in the Grampians could have been named after a lake in upper New York state, U.S.A. The name is Red Indian, and became familiar in Australia in the 1920's when the cultural movement of that name was started here, presumably by Americans from Chautauqua, where it still continues to encourage (as it has since 1874) local programmes of lectures, music and entertainment. Maps of the Grampians, and sign posts, leave out the first "u". Six teenagers were seen climbing the Elephant's Hide, which can become slippery and dangerous after rain. The sign post to

Epacris Falls reminded us that quite a number of names on the map are botanical in origin, some others being Mt. Rosea (after the now superseded specific name of the Rosy Bush-pea), Boronia Peak (which the writer found, on a previous visit, lived up to this name—it was not included in our itinerary this time), Cherry Tree Creek, Clematis Falls and Pansy Falls (the last-named perhaps because of species of *Goodenia*, the old popular name for which was "wild pansies").

At Reed's Lookout a splendid view over the Victoria Valley is obtained, the bronze tablet indicating such features as Paddy's Castle, Moora Moora Reservoir, and Lake Wartook. The fire lookout building is manned by a spotter on 24-hour watch in the summer months, the neat cabin having louvre windows on all four sides, with a string in the centre lined up with numbers to 360 around the walls so that an accurate bearing of the direction of any fire seen may be sent out to fire-fighters of the Forests Commission.

The track down to McKenzie Falls leads first to Broken Falls, then to Drummer Falls, and finally to the main McKenzie Falls, which are among the state's most impressive. Necklace Fern, King Ferns and Coral Ferns were prominent, and at least five species of *Acacia*, four of *Leptospermum*, and two of *Coprosma*.

Lunch was taken at Lake Wartook, the first of the many reservoirs to be constructed (1887). Its capacity is 23,800 acre feet, and the city of Horsham draws its town supply from it. After a walk along the dam bank, it was a delight to watch the rich bird life along the creek, especially a number of Flame Robins. A resident officer of the State Rivers and Water Supply Commission said that there are at present no koalas on the sanctuary island in the lake, but early re-stocking is intended.

The bus returned to Reed's Lookout, from where an enjoyable walk was done to the Jaws of Death on Mt. Victory, and many of the party were photographed on the *pièce de résistance*. Near Pulpit Rock there were masses of Golden Heath (*Styphelia adscendens*), and near Coronation Chair much *Epacris impressa*, mostly in the pink form but sometimes in the white. Two scorpions and a Copper-tailed Skink were seen. A misunderstanding about plans after visiting The Balconies caused a three-man search for an apparently "lost" member of the party. Back to the guest house and Madge Lester and Marie Allender's anagram game (or scrabble, or a tough crossword) for those not keen enough to join the botanical sessions!

Saturday, 7 September—Dick Morrison, George Collis, Ruth Doig and the Parkins climbed to the summit of Chautauqua Peak before breakfast. They saw six kangaroos, two of them fighting. Later they found the right track to Clematis Falls. The peak was shrouded in cloud, and the day was inclined to be drizzly. After breakfast, the bus took us past "Glenbower" (old home of the D'Altons) to Borough Huts. A botanizing stop was made at the diversion weir of Stawell Water Supply, where were found Orange Bell-climber (*Marianthus bignoniaceus*) (endemic in the Grampians, but not in flower), Plumed Humea (formerly *H. elegans* but now *Calomeria amaranthoides*), Umbrella Fern and other interesting species. Driving past the watershed between the Wannon River (flowing south into the Glenelg) and the Fyans Creek (flowing north), we stopped to search for Emu Wrens in heathland, but in vain. Purple Eyebright (*Euphrasia collina*) was quite plentiful. What was thought to be a yellow planarian worm was found, and holes seen that could

have housed the so-called "White Shrimp" of the Grampians (*Phreatoicopsis terricola*), which is a crustacean more closely related to the slaters of our gardens, but which, endemic in the Grampians, and in parts of the Otways, is close to a fossil form found in Triassic beds in New South Wales, i.e. is practically unchanged after 170 million years! (For further information on this creature, see the article by Ian McCann in *Geelong Naturalist*, Vol. 5, No. 1, April 1963. This issue, and the preceding one, contain excellent articles, too, on the Grampians flora.)

After a view of Mt. Lang and Teddy Bears' Gap, the bus arrived at Jimmy's Creek, where members of Ararat F.N.C. met us, notably the president, Rev. Colin Burtt, Cyril and Mrs. Larmoor, Misses Zoe and Lorna Banfield (the latter wrote a history of Ararat), Stan and Mrs. Kelly, and Susan Jutte (Botany Department, La Trobe University). Stan Kelly, author of "40 Australian Eucalypts in Colour", an excellent collection of his water-colour paintings published in 1949, will have published during 1969 a larger book illustrating no fewer than 250 species of the genus *Eucalyptus*, and is to be congratulated on his enterprise and assiduity. Since the death of Mr. Garnet Hately, from whom he obtained the material for his first book, he has been receiving eucalypt flowers, leaves, buds and fruits from the Waite Institute in South Australia. Fossicking for gold is his hobby, and he showed us some worthwhile "colour" in this other field. He had found these specimens on the old Mafeking field, south of Major Mitchell Plateau.

Soft and Hard Water Ferns (*Blechnum* spp.) were both growing along Jimmy's Creek, but the highlight for most of our party was the presence, in flower, of Flame Grevillea (*G. dimorpha*), a low shrub with the general appearance of Olive Grevillea (*G. oleoides*). This species is a Grampians endemic. Moving on to the Crossroads (the meeting place of Mafeking, Yarram Park and Moyston Roads), a stop was made for a walk among Variable Sallow Wattle (*Acacia mucronata*), Pink and White Heath, *Tetratheca* and *Leptospermum*. At Neale's Cutting, led by Col Burtt (in his A.I.F. beret—he was at Darwin during the war—looking very much the outdoor naturalist rather than the cleric), we searched a timbered area for orchids, but were only moderately successful. Species of *Pterostylis*, *Acianthus*, *Diurus* and *Caladenia*, as listed in the appendix to this report, were found. In addition, Eric Miles saw one Helmet Orchid (*Corybas* sp.) On the way back to the bus we watched two Grey Fantails on a large fallen log, with their characteristic flight. A species of *Cordyceps* (Vegetable Caterpillar), much smaller than *C. gunnii*, had apparently parasitized the larva of a Click Beetle. The bus driver stopped while Ian McCann and Neil Bennett searched for Blue Tinsel Lily (*Calectasia cyanea*), but it was scarce and only in bud. Just above the head of Lake Bellfield four kangaroos leapt away into the bush.

At night a social was held in the lounge, one of the high spots being the competition for the best paper-torn kangaroo. Les Rayment and Miss Joyce Annear arranged the program.

Sunday, 8 September—Fired by yesterday's example, the writer joined a pre-breakfast group consisting mainly of the same hardy spirits, and enjoyed a pleasant walk through mountain mist to the summit of Mackey's Peak, reached at 6.55 a.m. Photos of the sunrise were taken. The slippery rocks were the main hazard.

On the way to Stawell on the homeward journey an emu was sighted. A

stop was made at Stawell F.N.C. Wildflower Sanctuary alongside the highway, where there were many species in flower, but the most prolific were Golden Wattle (*Acacia pycnantha*), which was at its magnificent best at many places on this trip, and Mountain Grevillea (*G. alpina*). Near Ararat we passed, but had no time to inspect, McDonald Park Wildflower Sanctuary. Before reaching Middle Creek we passed over Charleycombe Creek, which is an unconsciously funny anglicization of the aboriginal word "Challicum", the pioneer sheep station of that name being so spelt. Galahs and White Cockatoos were seen again.

Thanks are due to our excursion secretary, Miss Marie Allender, who organized everything in her usual efficient way, but also to the many local naturalists who did so much to make sure we saw the best features of the area in our limited time. Praise is also due to competent, imperturbable driver Ray Hicks, who throughout the excursion exceeded the call of duty to add to our pleasure. In Ballarat on the return trip, for example, he drove around the city, pointing out historical points of interest, and took us up to the top of Black Hill, where, with its drilling rig, there is renewed activity.

APPENDIX

Lists of Botanical Species

Compiled by Miss L. M. White

Mt. Zero Trip:

Eucalyptus viminalis, E. goniocalyx, Micromyrtus ciliatus, Xanthorrhoea australis, Thryptomene calycina, Banksia marginata, B. ornata, Callitris rhomboidea, Westringia glabra, Hibbertia virgata, H. fasciculata, H. sericea, Isopogon ceratophyllus, Acacia mearnsii, A. brownii, A. longifolia, A. myrtifolia, Nidula emodens, Grevillea alpina, G. aquifolium, Stypandra glauca, Anthocercis frondosa, Drosera whittakeri, D. glanduligera, D. planchonii, D. auriculata, Correa aemula, Pterostylis longifolia, P. nana, P. vittata, Acianthus reniformis, Caladenia caerulea, Leptospermum myrsinoides, L. nitidum, Cheilanthes tenuifolia, Asplenium flabellifolium, Fossombronia sp., *Asterella* (syn. *Fimbriaria*) sp., *Daviesia mimosoides, Eriostemon brevifolius* (syn. *difformis*), *Dodonaea petiolaris, Kennedia prostrata, Pseudanthus ovalifolius, Prostanthera rotundifolia, Brachyloma ericoides.*

Near Flat Rock Aboriginal Paintings: *Carpobrotus rossii, Pterostylis nutans, Pultenaea scabra, Acacia dealbata, Correa aemula, Eriostemon brevifolius, Psilotum nudum, Casuarina pusilla.*

Near Ghost Cave: *Corybas diemenicus, Epacris impressa* var. *grandiflora, Ixodia achilleoides, Eucalyptus melliodora, Acacia mucronata, Exocarpos cupressiformis, Brachyloma daphnoides, Goodenia ovata, Histiopteris incisa, Tetratheca ciliata, Styphelia (Leucopogon) ericoides, S. (L.) thymifolia.*

Mt. William Trip:

Stylidium graminifolium, S. soboliferum, Spyridium parvifolium, Leptospermum nitidum, L. lanigerum, Acacia oxycedrus, A. myrtifolia, Amperea xiphoclada, Banksia marginata, B. integrifolia, Laxmannia sessiliflora, Styphelia thymifolia, Tetratheca ciliata, Casuarina pusilla, Conospermum mitchellii, Correa lawrenciana, Pultenaea subalpina, P. angustifolia, Pimelea spathulata, Prostanthera lasianthos, Eucalyptus alpina, Grevillea aquifolium, Phebalium

bilobum, Styphelia (Astroloma) pinifolia, S. adscendens, Euphrasia collina, Dianella tasmanica, Astrotricha ledifolia, Pterostylis longifolia.

FERN GLEN ON THE WAY BACK: *Dicksonia antarctica, Blechnum procerum, B. nudum, Polystichum proliferum, Clematis aristata, Pomaderris aspera, Eucalyptus cypellocarpa.*

TO A STOP NEAR GLEN: *Hardenbergia violacea, Veronica derwentia, Pultenaea scabra, Prostanthera lasianthos, Pimelea axiflora, Coprosma quadrifida, C. hirtella, Goodia lotifolia, Cassinia* sp.

AT CAMPING GROUND, HALL'S GAP: *Marianthus bignoniaceus, Calytrix sullivanii, Correa aemula, Pterostylis nutans, P. concinna.*

Stawell Trip:

BIG HILL AREA: *Pterostylis mutica, P. nana, Diuris pedunculata, D. palustris, Acianthus reniformis, Caladenia caerulea, Prasophyllum nigricans, Hovea heterophylla, Dillwynia sericea, Daviesia brevifolia, Brachyloma ericoides, Correa reflexa, Brunonia australis, Drosera whittakeri, D. auriculata, D. planchonii, Acacia pycnantha, A. melanoxylon, A. diffusa, Anguillaria dioica, Hibbertia stricta, Grevillea alpina, Chamaescilla corymbosa, Hypoxis glabella, Leptospermum myrsinoides.*

THREE JACKS SANCTUARY: *Cryptandra tomentosa, Hybanthus floribundus, Baeckea ramosissima, Glossodia major, Hypoxis pusilla, Caladenia caerulea, Grevillea aquifolium, Hibbertia fasciculata, Styphelia behrii* (syn. *Astroloma conostephioides*), *Acacia gunnii, A. mitchellii, A. armata, A. acinacea, Isopogon ceratophyllum, Pimelea glauca, Geranium solanderi, Pelargonium rodneyanum, Daucus glochidiatus, Indigofera australis, Craspedia uniflora, Ranunculus lappaceus, Pterostylis longifolia, Caladenia carnea.*

DEEP LEAD (MRS. BENNETT'S PROPERTY): *Helichrysum scorpioides, H. obcordatum, Micromyrtus ciliatus, Acacia pycnantha, Eucalyptus goniocalyx, Caladenia carnea, C. caerulea, Brachyloma daphnoides, B. ericoides, Styphelia (Lissanthe) strigosa.*

FERNS IN MINESHAFT: *Cyathea australis, Adiantum aethiopicum, Blechnum* spp., and others.

Wonderland Trip:

Pultenaea costata, P. angustifolia, Acacia dealbata, A. oxycedrus, A. myrtifolia, A. melanoxylon, Banksia marginata, B. integrifolia, Bossiaea cinerea?, Dillwynia oreodoxa, Acrotriche serrulata, Styphelia behrii, S. pinifolia, S. virgata, S. adscendens, Baeckea ramosissima, Boronia pilosa, Asterolasia phebalioides, Bursaria spinosa, Callitris rhomboidea, Calytrix sullivanii, Cassinia aculeata, Casuarina pusilla, Comesperma volubile, Conospermum mitchellii, Correa aemula, C. reflexa, Epacris impressa var. *grandiflora, Eucalyptus baxteri, E. alpina, E. cypellocarpa, E. viminalis, Hakea sericea* (syn. *acicularis, Marianthus bignoniaceus, Melaleuca decussata, M. squarrosa, Persoonia juniperina, Viola hederacea, Platylobium obtusangulum, Pteridium esculentum, Prostanthera lasianthos, Trymalium d'altonii, Todea barbara, Stypandra glauca, Thryptomene calycina.*

Black Range Trip:

BUNJIL'S CAVE AREA: *Cheilanthes tenuifolia, Morchella* sp., *Eucalyptus melliodora, Acacia melanoxylon, Asplenium flabellifolium, Acianthus reniformis, Pelargonium rodneyanum.*

At Lake Fyans: *Eucalyptus camaldulensis.*

Track to Clematis Falls: *Eucalyptus radiata, E. viminalis, Villarsia exaltata, Acacia verniciflua, Clematis aristata, Glycine clandestina, Exocarpos cupressiformis, Xanthorrhoea australis, Pterostylis nutans, P. concinna, Acianthus reniformis, Styphelia adscendens.*

Reed's Lookout: *Callitris rhomboidea, Eucalyptus alpina, Acacia melanoxylon, A. verniciflua, Stellaria pungens, Daviesia ulicina, Dodonaea cuneata, Asplenium flabellifolium, Leptospermum scoparium, L. nitidum, Correa aemula, Billardiera scandens, Gleichenia microphylla, Spyridium parvifolium.*

McKenzie Falls: *Brachycome ciliata, Todea barbara, Blechnum* sp., *Adiantum aethiopicum, Leptospermum scoparium, L. juniperinum, L. nitidum, L. myrsinoides, Grevillea repens?, Indigofera australis, Styphelia virgatus, S. ericoides, A. oxycedrus, A. verticillata, A. mucronata, A. mitchellii, A. melanoxylon, Daviesia brevifolia, Styphelia humifusa, S. behrii, S. adscendens, Eucalyptus baxteri, E. obliqua, Brachyloma daphnoides, Xanthorrhoea australis, Banksia marginata, Polystichum proliferum, Tetratheca ciliata, Platylobium obtusangulum, Pultenaea angustifolia, P. scabra, Coprosma hirtella, C. quadrifida, Hakea sericea (H. rostrata* seen on road before start of walk).

Diversion pipe area: *Calomeria amaranthoides* (syn. *Humea elegans*), *Bauera sessiliflora, Goodia lotifolia, Clematis aristata, Grevillea aquifolium, Selaginella uliginosa, Melaleuca squamea, Acacia mucronata, A. oxycedrus, Sprengelia incarnata, Casuarina pusilla, Euphrasia collina.*

Jimmy's Creek: *Blechnum minus, B. nudum, Goodia lotifolia, Grevillea dimorpha, Pimelea* sp., *Stackhousia monogyna, Dillwynia* sp., *Acacia retinodes, A. gunnii* (syn. *vomeriformis*), *Banksia marginata, Tetratheca ciliata, Styphelia ericoides, Epacris impressa, Acianthus reniformis.*

Granite intrusion near Mafeking goldfield: *Acacia aculeatissima, A. stricta, Viola hederacea, V. betonicifolia, Eucalyptus ovata, E. viminalis.*

Neale's Cutting paddock: *Acacia dealbata, Pterostylis nutans, P. curta, P. longifolia, Acianthus exsertus, Diuris maculata, D. pedunculata, Caladenia* sp. (leaves of a spider orchid), *C. deformis* (shown at night by Mr. Bennett).

On way home from above trip: *Calectasia cyanea* (in bud only).

Stawell F.N.C. Sanctuary: (seen on Sunday on way home) *Acacia pycnantha, A. gunnii, Kennedia prostrata, Grevillea alpina, Tetratheca ciliata, Pterostylis concinna, Diuris pedunculata, Drosera whittakeri, D. auriculata, Styphelia behrii, S. humifusa, Hovea heterophylla.*

Note: Also seen at various times these other eucalypts—*Eucalyptus leucoxylon, E. polyanthemos, E. macrorrhyncha, E. sideroxylon, E. dives.* Also, *Microseris lanceolata* (syn. *scapigera*), *Cymbonotus lawsonianus.*

* * * *

Editorial Note

In Part 1 of this report, published in the *Victorian Naturalist* for June 1969, reference was made on p. 163, to the Deep Lead memorial depicting a goat and a sheep.

In fact, the animals are two goats (male and female), representing the large number which existed on the gold fields to provide both meat and milk for the miners.

The memorial was erected in 1936.

Reference was also made to Mr. James Davidson, a former State School Inspector. He was in fact the brother of Mr. Bob Davidson, the present chairman of the F.N.C.V. Geology Group.

Since this excursion, news has been received that the J. J. Kingston Memorial Sanctuary has been completely fenced by the efforts of Stawell F.N.C.

Mr. Neil Bennett of Stawell F.N.C. supplied this information.

Problems of Wattles Part 1

by A. J. Swaby

In the twenties and thirties, the late Harold Smith and I made a study of the Lower Norton Mallee. Incidentally, that led to the establishment, last year, of the John Smith Memorial Sanctuary. (See below.)

A colony of wattles could not be identified: for they never flowered, so badly were the buds galled. Then in one season, all blossomed well. Something evidently attacked the gall insects. Many questions arise for you to answer.

In Vol. 76, Nov. 1959, Page 171, R. D. Lee contributed "The Great Gall Mystery". He dealt with galls in general and the mystery lay in the process by which the gall was induced. It is likely to remain mysterious.

In Vol. 80, March 1964, M. J. Lester recorded a detailed study of galls on Cootamundra Wattle. It was an excellent piece of work as far as it went and should have stimulated us to find a way of preventing the galling.

I collected seed of Coast Wattle for Wimmera Forests Nursery at Wail. Many plants were galled. I found that the insects emerged on the day when normal pods opened. The gall insect evidently has evolved so that its life cycle comes to maturity just when sap has been withdrawn from the pod. Delay would mean death.

What about the beginning? Can we prevent it?

At flowering time, the galled heads may show no sign of flowers. Some may show a tuft of yellow where each flower of the head or catkin should have been. My guess is that the eggs are laid either before the rudiments of separate flowers have formed or soon after. When is that?

Surely, there is a wattle growing quite close to each of us. Some members may have many. When are buds first seen? When do insects, acting suspiciously, arrive? At the other end, when pods are ripening and galls are present, what happens in a fine nylon cover on a gall or many galls? Specimens of emerging insects can be kept for comparison with insects seen about the wattles?

I have several wattles (no Cootamundra) and never a gall. A Cootamundra up the street gets hundreds of galls. Does each wattle have its own gall insect? I know that Black Wattle forms a gall very unlike that of Cootamundra, but are the insects different?

John Smith Memorial Sanctuary

Over 35 years ago, I asked Mr. Egbert Smith, of Lower Norton, near Horsham, to reserve ten acres of scrub. He agreed.

This is an "island" of Mallee type soil and vegetation. Probably it was continuous with the northern Mallee. When the sea was receding from the great Murray-Darling gulf, drainage from eastern Grampians had to find its way round the north of Arapiles where lakes Natimuk, Miga, Clear and White with swamps between, indicate its course to the Glenelg. Norton

Mallee was cut off. The valley of the Wimmera received deposits similar to the "black wimmera" soil and became populated with its vegetation.

Norton has no species evolved there, but has a considerable number now becoming rare and a few of very limited range. Outstanding are *Acacia glandulicarpa* and *Eucalyptus froggattii* the latter known elsewhere from near Bendigo only.

Upon the formation of Horsham Naturalists Club, questions arose concerning the status of the reserve. I assured them that no legal transfer had been made—it was still the property of the heirs of Egbert Smith. Ernest, son of Egbert, then donated 20 acres and set about transferring it to the Department of Lands, with Arapiles Shire Council as Trustees and a committee of management partly nominated, partly elected. Present indication is that the voice of Horsham Naturalists will be heard and heeded.

Management will be necessary. For a generous private gift the area is large, but it is too small for a permanent ecological unit. It is remarkably free from invading weeds, but they would inevitably appear. In parts, dominant species have suppressed others and have themselves reached a climax. A few interesting plants of the district are not included and must be brought in.

John Smith was the original settler, grandfather of Ernest. His eldest son, Harold, was an active member of F.N.C.V. for many years. He brought the area to my notice. His principal area of interest was the Black Range where he discovered Mount Byron Bush-pea, and became the host of scientists attracted by the discovery. For many years, Harold sent flowers for our shows. In 1938 on our behalf, he sent 104 species, all named, to Adelaide for a show.

A.J.S.

Vale Rolf McKellar

With sorrow, we record the passing of Rudolph Warren McKellar, O.B.E., J.P., a member since 1954.

Mr. McKellar's chief service to the community was in the Boy Scouts, where he was Commissioner of Bayside County for several years. His unobtrusive, but wise, superintendence earned him the high respect of the Movement and his appointment as Chief Commissioner for Victoria.

The demands of that office, with health less than satisfactory, prevented regular contact with the Club, but the interest of Mrs. McKellar and himself was manifest in their holiday home at Mt. Evelyn. There, they watched every development of indigenous and planted wild flowers. Some years ago, fire took everything. Our last talk with him, when he seemed to be convalescent, was about the regeneration and the appearance of treasures not known there before.

Last year, he was congratulated on the conferment of O.B.E. Characteristically, he attributed that to recognition of the Scout Movement.

This year, feeling free for more active work with the Club, he accepted office as Vice-President. Illness intervened.

Sympathy of all members will go out to Mrs. McKellar, their son, Ian, his wife and the grandchildren.

A.J.S.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Parrots

Mr. Howard Sloane of Mt. Clear near Ballarat, Victoria, sent these thoughtful notes on Parrots.

Few people realize the value of parrots in timber and honey production; and how these beautiful birds are vanishing from the landscape. Now that we stock our forests with millions of pollinating insects, the eucalypt trees that yield the honey crop are induced to set quantities of fruit; especially those that also pollen to bees—the Messmate, Grey Box and Red Gum.

Trees are encouraged to flower by a reduction of sap flow as in lateral and drooping branches, and the maturing of the crop of fruit becomes a burden, halting timber growth and preventing the trees from flowering for a number of years. It has been demonstrated that, if all fruit is removed, trees will continue growth and even flower annually. This considerably increases timber production and doubles the yield of honey. The role of the parrot is to remove the ripening fruit, and Black Cockatoos, Gang Gangs, and Rosellas are efficient in this work. They tend our forests and play an important part in the scheme of things.

When we came to this country it was well stocked with parrots, and the ring-barking of the box forest of the Murray Valley for grazing caused a population explosion. The dead trees provided excellent nesting sites, and the growth of seeding grasses and water supplies for stock made ideal conditions for these birds. Rosellas, Red Backed Parrots and Blue Bonnets flocked to the Murray Valley, and the little Titmouse was their companion.

The change to farming altered this, as before the adoption of the drill which buries the seed, wheat men on the land poisoned countless birds that gathered to eat the scattered grain, and parrots were also unpopular with fruit growers.

The dead timber has now gone, having either been eaten down by termites, or burnt and removed for farming. Nearly all aged nesting-site trees have also been removed, as it is not thought to be good policy to retain these. We now see the forlorn sight of pairs of Rosellas flying from tree to tree vainly searching for a hollow.

Parrots are weak on the wing and cannot forage far from their nests. One exception however is the Galah, which may be seen leaving the timbered rivers and creeks at dawn, and flying high as they go miles out on to the open plains for food. These birds have increased in number recently, apparently because the conditions suit them.

If our parrots are to be saved from extinction an effort must be made to retain aged trees, and possibly build nesting boxes as is being done for ducks. The starling is also a problem as it monopolises all hollows. A Titmouse has been known to nest with Sparrows in the roof of a house but never a parrot. This subject deserves our attention or we may lose these beautiful feathered friends.

Injury of Indian Myna *Acridotheres tristis*—

Mrs. Ellen McCulloch of Mitcham, Victoria, tells of the observations made by her husband, and Mr. A. Walker.

The most frequent reports of injuries to birds resulting from miscalculation during flight usually appear to fall into two categories—either direct flight into windows and other expanses of glass, or collision with tall buildings or high wires, often at night or when visibility is poor.

On Friday 23 May, 1969, several noisy House Sparrows *Passer domesticus* were seen fluttering together above a low, clipped privet hedge at the Yarra Glen golf-course near Melbourne. When approached the Sparrows flew off, and an Indian Myna was seen to be impaled on a thin bare vertical branch growing in the middle of the hedge, about 12 inches down from the top. The end of the stick protruded about 4 inches beyond the body, and had entered at one side of the chest, from the front. No bleeding was apparent either on the body or from the beak.

When lifted quickly off, the bird fluttered to the ground and squatted there, with head thrust forward, beak open. After 30 seconds or so it flew up towards a window-sill, failed to get purchase there, and flopped to the ground. Very shortly afterwards it flew slowly and with effort to the club-house roof, and finally to a small tree, where it clung awkwardly to a branch, appearing off-balance, and almost falling forward and off. Its eventual fate is not known.

Attention was first drawn by the noise of the Sparrows; the Myna made no sound after it was released. Visibility at the time was good.

This observation was made by my husband Peter McCulloch and Mr. Arthur Walker.

Interesting Fauna in the New Colony

Part of an article which appeared in the supplement to the Sunday Truth of 26 Jan., 1969, is published here with acknowledgment to that paper.

From the "London Chronicle", *dated October, 1788.*

Botany Bay, 26 January, 1788.

Your Correspondent now has the Honour to inform you of the most Interesting creatures we have observed since our Landing in New South Wales, and craves your most kind Indulgence for the inaccuracies and brief descriptions attempted by a person not experienced in the knowledge of the manner of such animals.

There are Kangaroos in immense quantities, animals very strange to behold. Varying in proportions, some are of small size, other are larger. They have pointed faces and ears remarkable like those of a fox only longer, and tails of considerable enormity in length like that of a rat only magnified a thousand times.

They jump in most curious bounds and leaps from one place to the next, and your Correspondent understands they make fair eating. The Natives eat them when they can catch them with their spears, which is not often.

Mr. Bowes who has partaken of the Kangaroo meat informs us that he cannot say it equals venison, nor even mutton.

Lizards there are in great abundance which are little to big in size and opossums, too, the latter being in length about five and twenty inches from the nose to the extremity of the tail, black to brown in colour, with a face not unlike that of an English squirrel's face but that the snout is more pointed in shape.

There are birds in great numbers, the parrots being of colours of considerable beauty, with pelicans and hooded gulls similar to the English species, black swans and a bird as large as an ostrich and swifter than a greyhound in speed when running on tall legs.

We have also seen snakes in plenty and fear their maleficient expression but we are informed by the Surgeons that not all are venemous as their countenances would admit.

Without a doubt we will find even more strange creatures when we have explored further and your Correspondent will have the Honour to observe them and describe them for your Entertainment.

Is it a Star or a Planet?

by MYFANWY BEADNELL

Many beginners are confused when trying to distinguish between a planet and a bright star. In general, the five bright planets are brighter than the stars, but this is by no means always so. The one certain way is to learn to recognise the constellations by studying the star charts month by month. In a year all the stars will have been observed and one can be sure that any doubtful object which appears to be out of place is a planet—unless it is that rare occurrence, a *nova* or new star.

Three rules to remember are:

All planets rise in the east, set in the west, and are north roughly halfway between their hours of rising and setting.

In the southern hemisphere, no planet can be seen in the southern portion of the sky.

If watched over several nights, the doubtful object will, if a planet, be seen to move relative to its neighbors.

The planets must be considered in two groups; the inner and the outer. The inner planets are Mercury and Venus, which have orbits between us and the sun. Therefore they are always fairly near the sun and can only be seen either before sunrise in the east or after sunset in the west. In the case of Mercury the time difference between it and the sun is never more than two hours, so he is only visible for a very short time in the morning or evening.

Venus, being not quite so near, can be up to four hours behind or ahead of the sun. At her brightest, Venus can easily be seen in daylight. From tables, her time difference behind or ahead of the sun can be read, and a search made in the appropriate part of the sky, remembering that, as with all planets, she follows roughly the same path as the sun through the sky. This path is called the *ecliptic*. She is at maximum brightness every eight years.

The naked-eye outer planets are Mars, Jupiter, and Saturn.

Mars is at his brightest every 15 or 17 years and is then very bright. One such occasion was in June 1969. He is always very red in colour, and when not at his brightest can easily be mistaken for Antares in the Scorpion.

Jupiter and Saturn, and also the two inner planets, can, when they are not at their greatest brilliance, be confused with Sirius, the Dog Star, or one of the other bright stars.

With even low-powered binoculars, Jupiter's four largest moons can be seen, and it is interesting to watch them appearing and disappearing as they revolve around the planet.

Saturn is distinctly yellowish, but this is not very obvious to the inexperienced observer.

By watching over a few successive nights, a planet's motion becomes very obvious. Because these far-distant planets take longer to go round the sun than does the earth, they appear to become left behind as the star sphere moves westwards, that is, they move eastward among the stars. But at times, a strange alteration will be observed; they remain stationary for a few days, move westerly (retrograde motion) for a few weeks, halt again, and finally resume their eastward motion. This is because the earth "catches up" and then passes the slower outer planet during its own journey.

Of the three outermost planets, only Uranus can be seen with the naked eye. Because he is at such an enormous distance from the sun, and takes such a long time to complete a revolution, his change of position is very slow. Neptune and Pluto cannot be seen with the naked eye, but with binoculars one can pick up Neptune.

Of the 15,000 asteroids or tiny planets, four can be seen with the naked eye or with binoculars occasionally. The orbits of these planetoids are eccentric and complicated calculations are required to predict their whereabouts.

Nature lovers should not fail, after having bought a set of star maps or a planisphere (planispheres are only 20c at the museum), to note from the weather page of one of the Melbourne daily papers, which planets are visible at night.

Monthly Microscopy Meeting

16 July

This meeting will be held at the Melbourne University Brownless Medical Library and Museum; when Professor Russell will give a lecture on "The History of the Microscope". It will be augmented by a demonstration of instruments in the museum.

All members of F.N.C.V. are cordially invited to share in this particular night.

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Letter to the Editor,

Dear Sir,

In reference to Mr. West's article on "The Grinding Rocks at Munro". published in the *Vict. Nat.* **86** (6) pp. 152-159.

By analysing the grinding grooves on the Munro site Mr. West has done meritorious work. It reminds me of a lecture on archaeology which I attended some years ago. The speaker was giving the results of his investigations of a shell (or kitchen) midden along the Victorian coast. He counted the shells found on the surface of a measured space on the midden, and multiplied the results by the extent and depth of the entire midden. He thus arrived at the approximate number of shells it contained, and was able to establish that a relatively small number of men, each daily eating a certain number of shellfish, were responsible for the accumulation over a certain long period of time; and that double, or four times that number of men could have accumulated the shells in a half or a quarter of that time.

However, the purpose of my letter is to record my resentment of Mr. West's suggestion that I went beyond the evidence. I may be accused of having a good imagination, but certainly not of over reading the evidence. I know my aboriginal sites and my Aborigines too well for that.

In the first place my term "super axes" defines a series of outsize axes, too heavy and too large to be hafted. The use they were put to has never been witnessed, but that they exist is beyond doubt. There are many specimens in the National Museum and in private collections. F. D. McCarthy, in "Australian Aboriginal Stone Implements", (1967), p. 43, states that they occur up to 9½ lbs. in weight. They have ground edges, so *they must have been ground on something.*

Secondly, my statement that they were used for digging out wombats. My late friend, the lamented S. R. Mitchell, with whom I frequently discussed stone implements, was emphatic that they were digging tools. On page 86 of his book "Stone Age Craftsmen" (1949) a classic of its kind, he states—

"An Aboriginal at Coranderrk informed the writer that these large tools were used by the Victorian Natives for digging."

On the same page Mitchell also made references to a large stone implement described by R. Brough Smyth in Vol. 1, p. 368 of "The Aborigines of Victoria" (1878). That author stated that it was found at Daylesford, and that—

"It is supposed to have been used for digging roots, and in sinking holes to get at the wombat."

I myself was told by the late Mrs. Hilda Tregonning, at Lake Tyers, that in her youth she had often crawled into wombat holes to enable her father to dig them out. When I asked her what tool had been used for the purpose, she answered: "a large sharpened stone".

Finally, I would like to state that since I described and numbered groups Nos. 1 and 2 of the Munro site, the two additional groups published by Mr. West should have been numbered 3 and 4, and not 1 and 4. Apart from the confusion it creates, it is not ethical for an author to renumber another author's work.

Aldo Massola

Field Naturalists Club of Victoria

General Meeting

9 June, 1969

The President, Mr. E. R. Allan was in the chair. He welcomed Mr. and Mrs. Muir from Dimboola.

Mr Allan said he had sent a message of sympathy to the President of the Benalla Club, Mrs. G. D. Brooke on the death of her son in a shooting accident.

Five new members whose names appear in the June "Naturalist" were elected.

The President read a letter that appeared in the Herald on 24th May this year from an American visitor in appreciation of Wilson's Promontory National Park. It stressed the need for its total preservation in its Natural State and urged that no more accommodation buildings should be erected. These destroy more of the park. In America now all motels and hotels are outside the parks. The Secretary announced that the Bird Observers' Club has arranged to have supervisors at Yellingbo on Sundays from 10 a.m. to 4 p.m. There is a plan to replant the creek area with Manna and Swamp Gum to ensure the habitat of the Helmeted Honeyeater.

A Monash University student is studying the ecology of the area and it is hoped it will be preserved.

A letter from the printers of the Naturalist announced increased costs of printing by one third and the increased price of glossy paper by 25%. The Secretary invited suggestions by members of means for meeting the situation without raising subscriptions.

The subject for the evening was "Some familiar plants of the family myrtaceae" by Miss Madge Lester.

She said that the talk was the result of fourteen years of field examinations of characteristics that placed plants in the family myrtaceae. She showed on the screen a diagram of parts of a flower and explained their functions and distinguished between the terms "family", "genus" and "species".

The world wide family Myrtaceae is very particularly represented in Australia giving the Australian bush its characteristic appearance. In general the plants of this family are woody trees or shrubs with simple exstipulate entire leaves, often with oil glands. The flowers usually have five sepals, five free petals, five, ten or numerous stamens, a single style and stigma and the fruit is a capsule, berry, or nut. Colour slides illustrated details of the features of several genera.

The genus Eucalyptus has alternate simple entire leaves with oil glands instead of the usual sepals and petals the bud is covered with a cap (operculum) which falls off as the flower opens.

Numerous stamens are the attractive part of the flower. The fruit is a woody capsule. Angophora shows no cap on the bud but five small sepals and five small petals and numerous showy stamens. The leaves are opposite and the capsule less woody than in Eucalyptus. Leptospermum (tea tree) has distinct sepals and showy petals, fewer stamens and woody capsules contrasting with Baeckea (heath myrtle) which has smaller flowers, fewer stamens that turn inwards and the very small capsules split by 3 or less lines compared with 4 or more in Leptospermum. Baeckea capsules do not remain on the plant as long as those of Leptospermum and its leaves are opposite while they are alternate in Leptospermum. Melaleuca species have a spike head of small flowers with 5 very small sepals and 5 small petals and numerous showy stamens joined in groups.

The capsules remain on the stem for years. Callistemon (bottle brush) is similar to Melaleuca but the long showy stamens are free. Kunzea petals are usually more easily seen than in the above but the numerous stamens are still the most showy. The capsules are less woody and only last a few months.

Eugenia (Lilly pilly) species show berries and very small flowers, the small sepals falling off as the flower opens. The stamens are numerous.

Thryptomene has small flowers, the centre darkening as it ages. The 5 sepals look like petals and are larger than the 5 petals. There are 5 stamens and the fruit is a small nut with one compartment and one seed. Calythrix has 5 sepals, 5 petals, numerous stamens and the fruit is a nut. The persistent calyx aids in dispersal. Micromyrtus, Tristania, Darwinia and Backhousia were also listed.

Geraldton Wax flower (Chamaelaucium) and a species of Calothamnus were shown as well as the New Zealand Christmas bush, the tropical American Feijoa and Myrtle both with berries. The talk was emphasised by careful recapitulation

or the characteristics of the family. Mr. North projected the slides.

The President thanked Miss Lester for the talk and said he was much indebted to her for explaining what he did not know. The members endorsed his appreciation with applause.

Mr Allan said that members should thank the editor Mr. Ward for the fact that their Naturalist arrived in time, as he had worked long hours on Monday and Tuesday nights to overcome the delays in printing caused by the general strikes. Notice was given that LaTrobe University Conservation Society has asked to be affiliated with the Club and this will be decided at next meeting.

Mr. Woollard announced he has some 1969 copies of the "Bird Lover" for 20 cents. The Herbarium has asked if any one could let them have a copy of "Wild Life" of September, 1943 to complete the Herbarium set.

The Secretary read a long report of what Sir Wm. McDonald said in Parliament concerning the Kentbruck Heathland and the Little Desert and plans to develop these areas.

Miss Jenny Forse spoke of her recent trip to the Little Desert with the Monash Biology group, and pointed out that if the best land of this area is taken out as proposed, the part left would not be representative of the whole area.

She brought pamphlets prepared by the Monash University Biological Society for distribution. The pamphlet claims that the land is infertile; that potential settlers risk financial ruin; that no complete Biological survey has been made; and that this is a thoughtless exploitation of an environment that can never be restored. It asks members to write to their members of Parliament asking that the subdivision be stopped until adequate evaluation is made. Mr. T. E. Muir who lives near the Little Desert told the meeting that of the farms of one to two thousand acres on the comparable Big Desert, everyone would walk off if he got a buyer but there are no bids. The Big Desert has a better water table than the Little Desert where the sand is about 30 ft. deep. Although plans for 44 blocks of 4 or 6,000 acres have gone through the House and applications called for, so far many applications are only for information.

Each must raise $54,000. If there are not enough applications, then it may be that access roads (which must be paid for by the buyer) will not be put in.

Expert opinion has been given that for a good farmer, the return may be 4% but it could be 2% or less. Answering a question if there are already grazing leases, Mr. Muir said there was a nominal fee but the land couldn't support a sheep to 10 acres.

Members were urged to continue to press their views so that Cabinet may decide to have another look at it.

Nature Notes and Exhibits

Mr. Graeme Love spoke of his trip through 10,000 miles of Australia and said that at Kambalda the authorities are so conservation conscious that if any employee is found destroying natural features he is dismissed. He mentioned that Broken Hill has two new National Parks. He showed Hematite from Nobles Nob mines, Kalie opal (Norseman), Local rock (Norseman and Kalgoorlie), Goethite and Hematite (Tom Price), Green stone (Kambalda), copper concentrate (Mt. Morgan).

Artifacts from Bald Hill near Bacchus Marsh were also on exhibit. Mr. A. J. Swaby brought *Acacia podalyrifolia* (Mt. Morgan silver wattle) *A. botrycephala* (sunshine wattle) *A pruinosa* (Frosty wattle) and a species of Dryandra.

Miss Anne Forbes showed *Boronia muelleri* from between Laver's Hill and Apollo Bay.

Specimens with berries collected by Mr. Ian Morrison on a Gippsland trip were *Notelaea longifolia* (Mock olive) with white and pink berries, *Coprosma nitida* (shining coprosma), *Leucopogon macraei* (alpine beard heath) *Coprosma hirtella* (rough Coprosma).

Mr. Swaby explained that the specimen of *Gaultheria appressa* (Waxberry) showed fleshy sepals resembling a berry.

Mr. D. McInnes demonstrated three binocular stereoscope microscopes bought for the use of members at Club meetings with the proceeds of the sale of Club microscopes. These can be set up by members themselves to show specimens at any meeting approved by council.

The President praised the work of Mr. Woollard and Mr. McInnes and their helpers responsible for the profits from the club microscopes assembled by them. Mr. J. Baines announced that there will be a series of publications by the Gould League, subsidised by the Education Department on birds of different areas including urban, ranges, and inland waters, the price being $1 each.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 July—Extraordinary meeting to consider affiliation of Latrobe Conservation Society, 7.55 p.m. General Meeting, 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for evening—'
4. New Members

   (a) *Ordinary:*
   Mr. M. L. Fitzpatrick, 3 Parsons Street, Croydon 3136. (Botany.)
   Miss Marjorie Gordon, 44 Fitzgerald Street, Balwyn 3103.
   Mrs. Zoe A. Smith, Flat 5, 31 Tourello Avenue, Hawthorn 3123.

   (b) *Joint Ordinary:*
   Mr. and Mrs. I. D. Cameron, 2 Blackfriars Close, Toorak 3142.
   Mr. and Mrs. B. H. Kemp, 21 Kingsley Road, Airport West 3042. (Geology.)

   (c) *Junior:*
   Miss Nicole Goudberg, Lot 46 MacKay Road, Rowville 3178.

5. General Business.
6. Nature Notes and Exhibits.

Group Meetings

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 16 July—Microscopical Group.

Friday, 26 July—Hawthorn Junior F.N.C. meeting att 8 p.m. at Hawthorn Town Hall.

Friday, 1 August—Preston Junior F.N.C. meeting at 8 p.m. in Rechabite Hall, 251 High Street, Preston.

Monday, 4 August—Entomology and Marine Biology Group.

Wednesday, 6 August—Geology Group.

Thursday, 7 August—Mammal Survey Group meeting in Rooms of Fisheries and Wildlife Department Library, 603 Flinders Street Extension, at 7.45 p.m.

Friday, 8 August—Montmorency District Junior F.N.C. meeting at Scout Hall, Petrie Park.

Thursday, 14 August—Botany Group.

F.N.C.V. Excursions

Sunday, 20 July—Sherbrook Forest. Lyrebirds and general study. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.30; bring one meal.

29 August-21 September—Western Australia. The party will leave by the evening train on Friday, 29 August arriving in Perth Monday, 1 September at 7 a.m. and will stay overnight at Jurien Bay, Tuesday to Friday Northampton, Saturday Geraldton, Sunday Wongan Hills, Monday Merredin, Tuesday Lake Grace, Wednesday Porongurups, Thursday-Friday Albany, Saturday Manjimup, Sunday-Monday Busselton, Tuesday-Wednesday Perth, departing Thursday evening by train for Melbourne arriving Sunday morning. Cost of this excursion is $260.00 including deposit of $50.00 paid when booking, the balance should be paid by the end of July and it would assist the excursion secretary if the bulk of the payments could be in by the July meeting, all cheques being made out to Excursion Trust. Members who have requested a sleeping berth between Melbourne and Adelaide should include the extra $13.50. Payments should be made to Miss M. Allender, 19 Hawthorn Avenue, North Caulfield 3161, who would also appreciate advice of items of natural history interest along the route and hopes naturalists in W.A. in these areas will contact the party and where possible spend some time on the excursion.

Boxing Day, 26 December to New Year's Day—Mount Beauty details later.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

President:
MR. E. R. ALLAN

Vice-President: MR. T. SAULT

Hon. Secretary: MR. D. LEE, 15 Springvale Road, Springvale (546 7724).

Hon. Treasurer: MR. D. E. MCINNES, 129 Waverley Road, East Malvern 3145 (211 2427)

Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg 3084.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra 3141.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: MRS. N. E. LEWIS, 1 Billing Street, Springvale 3171. (546 4649).

Sales Officer: MR. B. FUHRER, c/o National Herbarium, The Domain, Sth. Yarra.

Group Secretaries:

Botany: MISS M. BUTCHART, 23 Loch Street, Hawthorn East 3123 (82 1616).

Geology: MR. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073.

Entomology and Marine Biology: MR. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1969

Ordinary Members	$7.00
Country Members	$5.00
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Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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the VICTORIAN NATURALIST

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The 1969 Wild Flower and Nature Show

Where? The Lower Melbourne Town Hall.

When? Monday, Tuesday and Wednesday, 1st, 2nd and 3rd September, from 10 a.m. to 10 p.m.

This annual show is held by the Society for Growing Australian Plants (S.G.A.P.) and the Field Naturalists Club of Victoria (F.N.C.V.), mainly to bring before both young and older members of our community something of the beauty that surrounds us; as well as some of the rewards that can be ours by following the "Nature Trail".

It is also to make us more aware of the urgent need to keep intact all we can of our priceless bushland.

The flowers on display are all garden grown, and the enthusiastic growers will be most happy to pass on any points about this popular pastime.

A selection of Australian flowers from the Maranoa Gardens, Balwyn, will occupy a separate stand.

This year the central exhibit will be the work and inspiration of the Bird Observers' Club. Here, in a diorama, we will be shown some of the birds we might expect to see around our Melbourne and suburban home gardens, in the Botanic Gardens, and on our beaches.

A bird not found around here, and only recently rediscovered after a lapse of 28 years, the Mallee Whipbird, will be the theme of the 1969 pamphlet.

With the aid of specimens and diagrams the Botany Group exhibit will feature "Algae and Lichens", while diagrams and a collection of fossils arranged by the Geology Group will show "Life through the Ages".

Many groups are showing a keen interest in marine life, and, with the aid of the Museum, a group of Westernport divers researching that area, the Malacological Society, the "Marine Study" Group, and the F.N.C.V. Marine Study enthusisasts are combining to stage a very interesting exhibit.

The Preston Junior F.N.C. is also staging a marine exhibit.

The recently formed Montmorency Junior F.N.C. will show some of the natural history of that area.

The very enthusiastic Hawthorn Junior Field Naturalists will have various exhibits. One member will show an intriguing method of mounting insects in plastic. She is also responsible for an ant farm, and an exhibit which shows the skeletal structure of small animals while retaining the fleshy parts—X-ray animals!

The gem addicts will be busy faceting some semi-precious stones. Others will have collections of shells and of tektites.

Acquatic insects in aquarium tanks will be exhibited by the Entomological and Marine Group.

In glass cases we may see some live examples of our reptiles—snakes, lizards, skinks and tortoises.

Too small to be seen with the naked eye, and hence largely overlooked, is another entrancing natural world. To introduce you to some of this the Microscopical Group will show some examples with the aid of several types of microscopes.

(*turn to page 225*)

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

F.N.C.V.

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Hyla nasuta, from Gin Gin in Queensland, is one of the frogs listed in "Frog-hunting up the East Coast", the first part of which appears in this issue. The photograph was taken by Densey Clyne.

Here and There in East Gippsland

by Victor Jacobs

Ever since the names Suggan Buggan, Wulgulmerang and Mt. Seldom Seen had lured me to this area, and shown me their varied facets, the area had become one of my favourites. I had been back more than once, and twice used the route as a short cut home from New South Wales; but as then had never dragged a caravan over the mountainous roads. There certainly are some roads over which one would not dare to take a 12′6″ van, but this route is not one of them, and with care one can stop, in comfort, in out of the way places. The caravan is not just an eating and sleeping convenience for the family, but storage space for books that one needs if one is to gain the maximum information from observations. A few years ago, two or three books were all that was available to cover the information on Natural History, but now the position has improved to the extent that one may carry a small library.

On 29 December, 1967, just north of Buchan at 5.20 a.m., thick mist and cloud hung low as magpies were calling in the nearby trees, and ravens could be heard in the distance. Bird activity in the immediate area was intense as we observed Kookaburras, Grey Fantails, Brown Thornbills, Yellow-faced Honeyeaters, Brown-headed Honeyeaters and Rufous Whistlers. One adult male and five wrens busied themselves in a briar thicket. Amidst the roadside timber were scattered a few tall hyacinth orchids. Two Crimson Rosellas sat fast in a tall tree as a pair of Brown Flycatchers made a whirling pattern around them. Another flock of the Brown-headed Honeyeaters was seen, and also a male Hooded Robin. A secretive Scrub Wren eluded identification. As I returned to breakfast, two more Crimson Rosellas flew to an easily observed spot in the gum. One was an adult, the other had the all-green back of a juvenile. They sat side by side. Then the young one called and the adult regurgitated some food. It was quite easy to see the neck action and the youngster taking the predigested food. Another call and more food was supplied—in all twelve helpings! Then the youngster set off, closely followed by the other.

After breakfast we headed north and stopped at the W-Tree falls to enjoy the sight of water trickling over the rocks, and were lucky enough to collect a few seeds of *Acacia verniciflua* which grows above the falls. The next stop, a more lengthy one, was made at Leo Hodge's where the honeyeaters were busy on the lovely Grevilleas that grow there. My brother was amazed at their apparent tameness, and was able to fill the whole of a 35mm frame when he took a successful shot of an Eastern Spinebill. Of course they were not really tame, but behaving naturally in the presence of Mr. Hodge. In the very short spell that we were in the garden, they became somewhat cautious, and a second equivalent shot could not be taken.

From there we made short time to Wulgulmerang which looked quite different, being decked out for an eques-

trian affair. With Mr. Keith Roger's permission we drove down to the banks of the Little River where we set up camp. That evening we watched fish jumping in the pools in the running river.

A Red Wattle-bird calling from the nearest tree was our alarm clock. More of his "mates" answered from the other trees nearby. Most of the trees in the vicinity of our camp were fine examples of Black Sallee (*Eucalyptus stellulata*) and White Sallee (*E. pauciflora*). A large party of White-winged Choughs were busy in the wooded section half a mile up stream.

After breakfast we left in the car, and our first stop was at Little River Falls on the road to McKillops Bridge. Here there is now ample space to park a dozen cars and a useful track has been cleared to a safe viewing point for the falls. The falls were just trickling. On our walk to the falls we had seen many plants of *Grevillea lanigera*, but none in flower. The effect of the long drought, and the high December temperatures were to cut down greatly the plants in flower this season. A short drive took us to the turn off to the view of the Wulgulmerang Falls to Little River. From the end of the car road a well marked track leads one over boulders, between boulders, and around boulders, to a view of the river valley where the Wulgulmerang Creek should drop its water nearly 1,000 feet. No water was falling but the scenery was spectacular. Some energetic young people had descended to the bottom of the valley and just returned; quite a strenuous effort. There were quite a few splashes of gold made by a slender phyllodinous wattle. When back at camp, our identification using Ewart, named it as *A. penninervis*, and the specimen was discarded: but as that name is now restricted to the Avenel species, a future specimen will determine whether it was *A. obliquinerva* or *A. falciformis*. Another specimen identified was the Elderberry Panax, a handsome plant that had the frightening name of *Tieghemopanax sambucifolius* var *angustifolia*. It was quite frequent in this steep-sided valley.

We moved on to lunch at McKillops bridge. Here the Snowy River was showing much of its sandy bed. The concrete pillar of the bridge had many mud birds' nests, and also masses of

Angophora intermedia— our "living aviary".

photo: Author.

bees nests under the lips of the concrete. *Acacia boormanii* had shed all its seeds, but *A. sylvestis* still had some full pods worth collecting.

As we packed up on the last day of December, Red Wattle-birds and Brown Thornbills worked in the Sallees around us while Spur-winged Plovers and Mudlarks were busy in the open paddock. After saying our goodbyes we headed up Black Mountain, through Suggan Buggan, and up another long pull to cross the Monaro Gap.

The Snowy River soon came into view and we made camp an hour before noon. The Snowy was more bed than river, and rarely as much as two feet in depth but the day was hot, and we soon took advantage of the cool water for frolics and dhobi. The water that normally came down from the Kosciusko area was firstly reduced by the small amount of snow that had fallen during the previous winter, and secondly by the new Jindabyne dam which blocks the river completely except for one small pipe on the lower side discharging a mere trickle of water.

With this mere trickle the Snowy would have been really dry, but luckily the Jacobs River was pouring a good volume of water into it.

In the clearings many Blue Wrens were active, while along the river banks we saw Grey Fantails, Yellow-tufted Honeyeaters, a Pied Currawong, a Nankeen Kestrel and a few Rainbow Birds.

Towards evening we walked up Pine Creek which separates Victoria from New South Wales. The last time we did this, some six years ago, it had been an easy stroll, as for about half a mile the smooth sandy bed was like a well-planned drive. Now very little sand remains and the bed is strewn with boulders of all sizes. *Acacia amoena* is common on the banks, and we were able to collect as much seed as we wished. A dead wombat in advanced state of decomposition appeared to have died because one of its teeth had prevented it from feeding. No seedling pines were seen, but around a large Black Wattle was a minature forest of seedlings. A small dull shadow moving amidst these seedlings became anything but dull when it opened its wing coverts to show a red neck and a dark blue back with light blue dots. It was a Mountain Grasshopper. When the wing coverts closed the camouflage was near perfect.

On the first day of the new year, a fair morning with light cirrus cloud suggested a dawn walk; so at 6 a.m. we headed south along the river banks and bed, following some deeper meanders and fording shallower ones. Kangaroo tracks were common in the softer loose sand. The first birds sighted were a pair of Hooded Robins having a bathe and a preen. We saw many of this species, and also Rainbow Birds which had tunnels in the sandy banks. Many young Silver Wattles grew along the river banks.

Some bright yellow dots gleaming in the sunshine attracted my attention. They were the laden pollen baskets on the legs of bees visiting a mass of Evening Primrose which conveniently for them, had the petals wide open and also the stigmatic surfaces receptively spread. Soapwort was also frequent here.

Attracted by bird calls we scrub bashed a short distance to observe a pair of Rufous Whistlers, a Grey Fantail pursuing a Yellow-tufted Honeyeater, a Golden Whistler and Spotted Pardalotes. Four Black Ducks flying along the river drew us there again where we watched four White-faced Herons standing frieze-like on a bare dead tree. A crimson headed Gang-

gang flew past and called to warn a pair of his species who were drinking from the river.

We crossed to the far bank and headed for Willis. Suddenly a crashing in the scrub startled us a great deal as two emus, with blue necks gleaming, went scudding away. Surprised may be more accurate than startled, as I had mistakenly become used to thinking the emu a bird of the plains. Grey Thrushes and Red Wattle-birds were seen along this section. By the time we reached camp, the sky was fully overcast and threatening, so knowing what these roads can be like when wet, we moved north. Great improvements have been made in widening, straightening and smoothing this road so that we had no bother pulling up Jacob's Ladder to Wallace Craigie Lookout and so on to Jindabyne. But this takes me beyond East Gippsland with a lapse in time but not in activities, for it was at Cotter River that I saw my first pair of Misletoe Birds.

From Bombala and on through Nimmitabel we traversed brown, dry, treeless country in which a single paddock of green oats was most conspicuous. Conditions became more pleasant as we climbed into eucalyptus forest and then down to the rain-forest, the Victorian Border, and Cann River where all was pleasantly green. The general drought conditions in Victoria were not prevailing here, where fresh grass and spring flowers were widespread. We ended the day's travel in a roadside clearing 9 miles east of Cann River.

On the morning of 10 January, there was a dawn chorus of Magpies, Kookaburras and one loud harsh Red Wattlebird.

The top soil here was quite damp, and the eucalyptus had new growth. In the open roadside community, Purple Fan-flowers and Coast Rice-flowers were frequent. Less than thirty yards from the road the vegetation change is abrupt, the slope being acute and covered thickly with tall bracken. Here was a patch of seedling narrow-leaved wattles besides the fire blackened trunks of the parents. A White-throated Treecreeper with a rusty rump crept up a gum as a Grey Wallaby crashed off down the gully. Near the bottom of this wet gully was a large area of Pouched Coral Fern, and near to it a Rough Tree Fern with a 6 foot high trunk. Close beside, a giant that had fallen many years since and rotted away, supported many herbs and a number of medium sized shrubs. The bottom of the gully had a running creek, thick Swamp Paperbark, Austral Treeferns and Scrambling Coral Fern. There was another fern too that looked very much like Hard Water-fern.

Back after breakfast, the family helped to shell wattle pods; this time *Acacia botrycephala*, which is plentiful in this area. They were not exactly unwilling with their help, but on the other hand they did not volunteer it either.

From here we moved on to Genoa and Mallacoota, where the first impression of the camping ground seemed the exact opposite from what I expected from a National Park—crowded tents, stores, and noisy boats; but this luckily was only a part of the area. There is a very large area here to choose from, and if one does not mind walking a hundred yards to the facilities, one can have a quiet camp adjacent to the scrub. We chose for our site what at first glance appeared to be a large gum tree, but turned out to be a magnificent specimen of *Angophora intermedia*. Three females and one male Blue Wren were clearing up crumbs left by the last users. Little Wattle-birds called from a nearby Blue-gum. Eastern Spinebills and Black faced Cuckoo-shrikes were also noted. After lunch a South West change brought thunder and 75 points of rain. Three days pre-

viously they had 85 points. No wonder the area was so verdant and pleasant. No wonder that some of the campers were complaining that it was too wet.

It was dull and cloudy at 5.30 on the morning of the next day, but with no wind. From the van site I could see a Grey Thrush, Kookaburras, Pipits and some Yellow-winged Honeyeaters. When a couple of the latter approached the mistletoe over my head, a Little Wattle-bird that was being especially noisy, chased them off. The scrub near to the caravan was composed mainly of *Kunzea ambigua*, young *Angophora intermedia, Eucalyptus bicostata, Acacia longifolia* and *A. mearnsii*, Banksias and *Melaleuca armillaris*. This level scrub plunges into a gully after a few yards, but a path leads to a large open rectangle and I walked this way. The area has been cleared for an extension of the camping facilities but the Kunzea and Banksia are attempting to regenerate. The sides of the square were solidly composed of the Bracelet Honey-myrtle, so often seen in our gardens. This is one of the interests of Mallacoota; to see so many garden plants growing in their wild state. Or should I say *states*. The Bracelet Honey-myrtle for instance reaches a height of 60 feet with a six inch trunk and no lateral branches in the dim sheltered gullies. On cliff tops it often has a mallee form with from seven to ten eight-inch trunks, and a height of 25 feet. On the windswept open beaches it forms a dense interwoven shrub up to 18 feet with leaves only at terminal points, looking as if someone had covered its windswept, dun baldness with a green, silken head scarf. In the sand dunes west of Bastion Point, the only large specimens were dead and burnt, but the young replacements were already five feet tall.

This route led to the cliffs, where in the shoreline trees, Yellow Robins and Grey-backed Silvereyes were as active as the Blue Wrens on the ground; and a dozen Brown Thornbills fed on the mistletoe. The pool inside the sand bar had a pelican floating idly, a fishing cormorant, and a group of watchful Silver Gulls. Here and there, steep, wet gullies intersect the coastal plateau, and I slid down one of these to the beach where I had to negotiate huge masses of decaying seaweed and blackened sand. The smell was atrocious, but that did not deter the feeding gulls that stood in it, or the lively families of Blue Wrens which bounced out of the cliff scrub to peck away amongst the decaying mass. A solitary Crested Tern fished nearby, and occasionally hung on the wind so steadily, that the white dots on the front of the cap were visible. At Bastion Point where the tide was low, many Silver Gulls were working the rocky pools, and amongst them were a dozen Pied Oyster-catchers. Two Sooty Oyster-catchers kept aloof.

On the beach the mauve of Sea Lavender caught my eye, and as I went up the cliff I noticed another familiar garden plant. This was *Correa alba;* in dense bushes five feet high. The ones at the base of the cliff were not in flower, but at the summit they were massed with white stars. This is one correa that does not have tubular flowers. Another shrub with tubular white flowers, red drupes, and shining green ovate leaves remained unidentified until October when I recognized it easily in "Flowers and Plants of Victoria". It was the Sea Box (*Alyxia buxifolia*). From the cliff top I watched a Whimbrel pecking its way along the far beach, and then headed for camp. In one gully that I traversed I saw a new plant species with handsome yellow flowers, the Bladder Ketmia, (*Hibiscus trionum*), and in the next gully Prickly Currant-bush (*Coprosma quadrifida*).

Shrubby Sheoak was common on the level ground.

On the walk back I noted Yellow-winged Honeyeaters, Yellow-faced Honeyeaters, Grey Thrushes, Eastern Spinebills, Rufous Whistlers, Blackbirds and Goldfinches. This had been a rather full pre-breakfast walk.

The following day dawned with a clear blue sky. Our Gum Myrtle was again an aviary, containing a flock of Orange-winged Sitellas, a Willie Wagtail, Brown Thornbills, an Eastern Spinebill, and a couple of Yellow-winged Honeyeaters. I heard raucous cries and saw seven Yellow-tailed Black Cockatoos fly east towards the offshore islands.

Simone and I set off to follow the route of yesterday until we came to Bastion Point. On the leeward and eastern side of the point the rocks shone red in the morning sun, but the windward side was completely blackened with a heavy layer of seaweed flies. The masses of decaying seaweed supply them with food and a place to lay their eggs, but at this moment they were sheltering from the brisk, cool breeze. A piece of rock or seaweed tossed against the black mass would dislodge a few but the whirling, swarming cloud so formed would soon settle again.

Rounding the point, we walked along the clean sea-swept beach watching a solitary fisherman arcing his heavy leads into the light surf. A couple of hundred Silver Gulls and one Crested Tern were also watching hopefully. As we approached, the birds took alarm—the tern leaving first, and then the others, first flying up wind then turning and swooping over the dunes.

We found a plank of driftwood colonized by dozens of stalked barnacles. Some of these animals had stalks 5 inches long, while others had no stalks at all. We propped it up with a stick, the barnacles hanging down, in order to take a photograph. Some of the plates opened to allow the feathery legs to protrude and beat the air. We tried to leave it in the sea but the waves threw it repeatedly on the shore and there we finally left it, feeling relieved that the animals could shut down their hatches and wait till the next tide.

We climbed the dunes and headed back to camp, sheltering from the wind and easing ourselves through the thick young Bracelet Honey-myrtle; and as we moved we flushed Grey-backed Silvereyes and three Little Cuckoo-shrikes; one of them immature.

During the afternoon we drove towards the head of Mallacoota Inlet where there is a magnificent forest of

The bay east of Bastion Point, Mallacoota.

photo: Author.

Coastal Banksia already giving a hint of the beauty of its cones.

A lazy day followed; merely recording the following birds—Grey Thrush, Yellow Robin, Rufous Whistler, Grey Fantail, Scarlet Robins, Golden Whistler, White-throated Treecreeper, Mudlark, Spur-winged Plover, and Red Wattle-bird.

On the succeeding day, I went to one of my favourite watching spots, halfway up a gully just north of our site. Here it was possible to sit on a log and at the same time watch both the birds of the gully and those moving through the leaves at tree top level. In the tree tops a Grey Fantail and a flock of Orange-wing Sitellas fed, while in a clearing half a dozen wrens like blue and brown feathered balls were active. Yellow-winged Honeyeaters sped through the tree tops while Yellow-faced Honeyeaters followed the same route. A Whip Bird cracked out his call. Up the massive trunk of a Blue Gum went a tree creeper with a red rump and a reddish spot behind its ear. In a small gully off the main one, Grey-backed Silvereyes fed on Prickly Currant Bush, while high overhead on the mistletoe an Eastern Spinebill spent a few moments. A familiar yet rather strange call attracted my attention to a shaft of sunlight in the gully where a golden winged bird had appeared. Its mate appeared and I was delighted to see a pair of Rufous Fantails courting and calling each other. The call is similar to the Grey Fantails yet more solid. This was something special so I went to fetch Simone and they were seen again when we arrived back there. Simone stayed a while and in that short time saw Red-browed Finches, White-eared Honeyeaters, Striated Thornbills and Spotted Pardalotes.

That evening a walk in the lightly forested area along the cliffs disclosed a finch-like bird in good viewing position, where it sat so long that my sketches enabled me to identify a Diamond Firetail Finch. Even so I had not seen the scarlet of its rump and tail. In a small nearby pool a White-naped Honeyeater was bathing. In this area there was plenty of Yellow Star and one plant of Apple of Sodom *Solanum sodomaeum*. With a whoosh of wings a magpie sent off a flock of Dusky-Wood swallows using an Angophora as a base. They moved into a large clearing using a slender pole of about 4 inches diameter instead. Only three could fit on the flat top, but up to five more clung to the sides and at least a further four were in flight. There were juveniles with black and white speckled-wings. In some the chest was speckled grey and in some brown. In all the young ones the tail was adult like. The young ones often perched momentarily on shrubs and herbs very close to ground level.

This was our last day at Mallacoota, and on Monday we headed west, still driving through the green belt. This pleasant area persisted untill we passed through Orbost, but before Lakes Entrance the country side became burnt, dry and hot; a state of affairs that persisted for many weeks.

* * *

During the second week in May, 1968, we left Narre Warren North fairly early and proceeded along the Princes Highway to Stratford, then turned north to Briagalong, where on advice we turned off what seemed to be the best road. All of my maps showed a good route from Stratford through Culloden and Cobbannah to Dargo. However this route was not suitable for the van, and we detoured over dirt roads via Stockdale to Fernbank, where we found a good highway running all the way to Dargo. The detour that we took would have been very difficult if it had been raining at all, and I would advise anyone heading for

A "Blow" west of Bastion Point.

photo: Author.

Dargo from Melbourne to continue on past Stratford for 14 miles, and then turn north to Fernbank and on to Dargo.

The country side was green all the way with the rivers flowing. Near Briagalong there were many white Cockatoos. Eastern and Crimson Rosellas, too, were common once we had left the Highway, the former in the level country and the latter in the hills. At Waterford we passed the junction of the Wonnangatta and the Dargo River, which merge here to become the Mitchell River. Soon we sighted the smoke of the wood kiln at Dargo timber mill, and were driving up the main street of that marginal tidy township to cross the bridge and park beside the gently flowing Dargo River. One may ask—why marginal?

It lies on the edge of the highland plateau which seems safe from man's intervention and yet is linked by road to the great metropolis, the great, spreading, greedy monster; linked, yet still untouched by it. Hardly had the van been parked than a dozen or more Blue Wrens were busy around looking for scraps. They were, we thought, all females or young males, but as the days passed and not a fully plumaged male was seen, we realised that all the males in this high altitude must have gone into eclipse plumage.

At dawn on the 14 May, it was raining hard; then at nine o'clock large flakes of snow began to drift down. Within half an hour the locality and the roughness of the encircling hills was softly rounded in white—a pretty scene. At noon however, more rain melted the snow, and we kept as warm and active as we could within the van. Conditions improved in the evening so we took a short walk and again noted many dull plumaged Blue Wrens, as well as numerous Flame Robins. Some Brown Thornbills, Brown Flycatchers and one ground feeding White-eared Honeyeater were also seen.

On the following day, vehicles at the store, which had driven in from the High Plains, were wearing chains, and had caps of snow on roofs and bonnets. Even so we decided to have a look and drove north. On the very edge of Dargo large flocks of White Cockatoos, Pied Currawongs and Crimson Rosellas were active. Three miles north, snow lay on the road and seven miles further on at Spring Hill Junction it lay six inches thick, so we turned the car and walked up the hill. The snow was fresh, soft and powdery, lying on the trees and shrubs, and on a score of tree ferns making them look like native beehive huts. Three Yellow-tailed Black Cockatoos creaked mournfully as they slowly moved through the

tree tops. White-browed Scrub Wrens worked through the undergrowth. A Yellow Robin was seen. We saw many emu and kangaroo tracks in the snow. That afternoon we walked from camp and found a small stream that led into the Dargo River. The junction was thick with weeds, and more Red-browed Finches than I could count were feeding in this small area. One young one investigated me. The banks of the rivulet were a smooth emerald green, with various fungi particularly visible. From a bird watcher I changed into a food collector, and for tea that night we started with watercress (*Nasturtium officinale*) sandwiches and continued with bacon and eggs garnished with field mushrooms, sliced puff-balls, and whole delectable Shaggy Caps.

The next day, the sun was up in a blue sky as Simone and I followed the mushroom trail of the previous evening, collecting enough for a meal and some for home. The first bird we saw was a Scarlet Robin, then many wrens. A thicket of rose bushes was festooned with Crimson Rosellas feeding on the hips. Three bright birds in the tops of some willows looked as if they were part of the normal scenery which was unexpected, because my previous glimpses of King Parrots had been when driving along tortuous mountain roads and they had hurtled past. Here the two males and one female out-sat our watching eyes.

The day was still better than expected after the previous freezing ones, so we drove south towards Waterford and turned right after 5 miles to wind along the Wonnangatta valley. We soon had to stop and reach for the cameras as a magnificent view of Castle Hills filled the western sky. To follow the road to the head of the valley is one of my ambitions, and should be that of anyone who wants to enjoy peace and beauty. The day so far had been far from dull, and just beyond the turn off some large birds fossicking around fallen timber had been identified as four Spotted Quail Thrushes. We had never seen them before. The next day on our way back to suburbia, we saw both the Quail Thrushes and King Parrots again, the former on Peels Gap and the latter near Castleburn Creek. We were able to watch the first group of Spotted Quail Thrushes from the car as they fed and moved oblivious of our presence. The second lot were only seen on the roadside, and as we came to a halt and got out, they rushed out of sight through the scrub.

Identifying new birds from a glimpse is almost impossible, yet if one can peruse a new species at length, some permanent but indescribable pictorial image seems to persist so that a mere split-second sideways gimpse is enough to give certainty at a later date.

A few miles farther on we found a large clearing where we parked till mid afternoon. By now the sun was so warm that it was a sunbathing day. On the nearby river, a tree held a drowsy Pied Cormorant, while up in the gullies White-throated Tree Creepers led me on amidst the numerous young Golden Wattles springing up.

Next day belied the one we had enjoyed, and we headed for home on schedule, our only major stop being at Mr. Cane's nursery at Maffra.

* * *

Have you been to East Gippsland If not, many delights lie ahead of you. Maybe we will see you on the Dargo High Plains which eluded us in May, and are beckoning strongly.

Problems of Wattles Part 2

Wattle Glands

by A. J. Swaby

Wattles with true compound leaves have little pimples on the leaf-stalk or extensions of it. Phyllodes usually have one on the upper edge. The centre of the pimple is depressed and a sticky substance may exude. We call them glands.

For many years the accepted theory has been that the sticky stuff attracts ants and diverts attention from the flowers. Bees, flying from flower to flower, would be more welcome for cross pollination than the slow ants.

Careful observation of Sunshine Wattle over three years does not support the theory. It has very large glands and the exud-tion completely covers the tender leaflets and the tiny clusters of buds. Bees and ants explore the plant, but show no interest whatever in the sticky cover. To us, it is quite tasteless.

Like many others, the tips are red and stop the chemical rays as does the red light in photography. As they toughen and turn green the covering vanishes. It may evaporate, but it does not become liquid on the hottest day. It may be absorbed, but how?

Do any other plants produce a similar cover?

After a year or so, observation might be discussed and reported. Please help.

Some confusion may have arisen from ants on trees. Scale insects eject sugary liquid which may cover leaves like a smear of honey or even be seen in a mist spray covering the ground. Ants enjoy the feast.

Wild Flower and Nature Show (*cont. from page 214*)

There will be a Publications stand where natural-history books, magazines and pamphlets may be purchased. Information relative to the F.N.C.V. may also be obtained there

Maybe the most popular feature of the Show will be the Wildlife films kindly made available by the State Film Centre. These will be shown frequently and are *free.*

At the August General Meeting of the F.N.C.V. rosters for helpers at the Show will be distributed. As some of the usual "stalwarts" will be absent this year, they hope there will be many members willing to take their places and to fill many others. Though missing, they don't want to be missed! Daytime helpers are especially welcome. The setting up of the Show on Sunday, 31 August, will require all the assistance available from 9 a.m. onwards. Will new members note that this is an excellent opportunity to get to know fellow members.

Also available at the General Meeting will be window cards, car stickers and, for distribution to schools, small posters and bundles of pamphlets. With your help your committee would like every school in Melbourne and the suburbs to receive these. Please advertise our Show as widely as possible.

Admission: Children, 10 cents; Adults, 25 cents.

Frog-hunting up the East Coast
Part 1

by Densey Clyne

During the Summer of 1968 I spent a few weeks travelling up the N.S.W. and Queensland coasts, mainly to record and photograph frogs.

The first six days were spent in the New England District of N.S.W., where I was lucky to have with me on several collecting trips a local naturalist and collector, Jim Frazier, of Armidale. His knowledge and expertise resulted in the capture by daylight of many frogs which I would have missed, as my own practice is to hunt them after dark, tracing them by their calls.

However, some species do call during daylight hours, and one of these is the Sphagnum Frog (*Kyarranus sphagnicola*). On a trip to New England National Park, we heard several males calling from a sphagnum bog in rainforest, and a male and two females were found deep in the moss itself. The call is a single, long note, rather like the sound of a straining ship's hawser, and diminishing in intensity from start to finish.

This is quite a small frog, smooth-skinned and bright tan in colour. When the legs are flexed a continuous dark bar runs diagonally backwards on either side of the dorsal surface of the body, and out across the thighs. Ventrally the colour is reddish-orange.

The male Sphagnum Frog has a rough black nuptial pad on the first (inner) finger. These pads are found on males of many frog species, and probably help them to grasp the slippery body of the female during mating. The first and second fingers of the female have the wide flanges common in frogs with a frothy eggmass. This frog appears to be confined to the locality where we found it.

The only other species in this genus is also found in the district. Very similar in general appearance, but smaller and a little less colourful, *K. loveridgei* differs in both voice and habitat from the previous species, and the male lacks the nuptial pad. The call is short and rather like the grunt of a pig.

Jim had located some of these frogs earlier, in a densely overgrown rainforest creek in the Gibraltar Range National Park, between Glen Innes and Grafton. We parked the van and forced our way through scrub and brambles to the edge of the water, and after some trial and error pinpointed a calling male. This was a very different habitat from that of the Sphagnum Frog; males had to be dug out of holes just above the surface of the water, in the deep, tacky mud which formed the bed and banks of the creek.

K. loveridgei was first reported from rain-forest in S.E. Queensland, and appears to have a restricted distribution.

The Tusked Frog (*Adelotus brevis*) is unique in having a pair of large, tusk-like structures on the front of the lower jaw, inside the mouth. We heard males of this species calling from the margins of creeks in both the New England and the Gibraltar Range National Parks, in both of which places it was located, and at Governor's Waters, a few miles from Armidale. It is a medium-sized frog, dark in colour, the male having a broad head and shoulders—much broader than those of the

The Tusked Frog (*Adelotus brevis*) from New England, N.S.W.

photo: Author.

female. The ventral surfaces are strikingly blotched in black and white, with areas of scarlet on the legs.

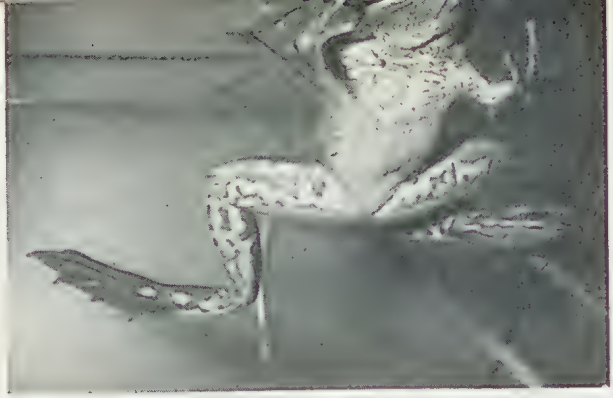
The frogs were calling from well-concealed positions under overhanging banks of the creeks, close to or at water level. The call I taped starts off as a single note: "dock!" which gradually changes to a double note, a liquid "dollock!" The second part is like an echo of the first, and heard clearly if the tape is played back at a slower speed.

In most of the places we visited, frogs of the widespread genus *Limnodynastes* were found. The pretty little Spotted Marsh Frog, *L. tasmaniensis* was common around the borders of dams and ponds, calling from the open or under stones at the water's edge. The sound was well described by Moore (*Frogs of Eastern New South Wales*) as "a very rapid 'uk-uk-uk-uk' like a small boy imitating a machine-gun", and it is unmistakeable. Dorsally the frog has large irregular, olive-green blotches, and a light or coloured stripe down the centre of the back. The throat of the breeding male is yellow. Specimens were captured on the Barwick River, New England National Park.

The four or five individuals of its larger relative, the Brown Frog (*L. peroni*)—caught in the New England area differed from specimens in my Sydney garden pond, the latter being striped light and dark brown. The New England individuals, collected from Snowy Swamp near the New England National Park, and from a property at Guyra, were more olive-brown or olive-green. Because of this, and the pinkish dorsal stripe, they were thought at first to be very large specimens of *L. tasmaniensis*. However, the size, the pattern of lengthwise stripes rather than spots or patches, and finally the unmistakeable calls coming later from captives in my Kombi van during the night, clearly distinguished them as *L. peroni*. The call of this species is a single, brief, unmusical "toc", and although at the height of a large chorus it may become elaborated into a series of up to six notes rapidly repeated, it sounds more like a ping-pong ball bouncing, than a machine-gun.

The large, toadlike Banjo Frog (*L. dorsalis*) is the biggest member of this genus. The call is a pleasant twanging note which in chorus becomes one of the most attractive animal sounds I know, and gives rise to this frog's common name and its curious alternative, "Pobblebonk".

From dense reedbeds in Dangar's Lagoon near Uralla, N.S.W., where I camped one night, a guttural, barking "rawk!" was heard, repeated at long



The Golden Bell Frog (*Hyla aurea*) from New Engalnd, N.S.W.

photo: Author.

intervals. I couldn't find the caller but later, camped at Rocky River between Uralla and Armidale, I traced a similar call to a small pool in sand in the almost dry river bed. I found a medium-sized frog with dark dorsal patches, larger and stouter than *L. tasmaniensis*, and generally an undistinguished grey-brown. This was probably the Long-thumbed or Barking Frog, (*L. fletcheri*) but it escaped and so the call could not be positively identified.

The only specimens we found of the Great Barred Frog (*Mixophyes fasciolatus*) were two juveniles, one in the Gibraltar Range and one in the New England National Park. Though these were small enough to retain a vestige of tail, the legs and arms were already cross-barred and the head clearly banded from the front of the snout through the eye to the shoulder. This is a very handsome species, growing to as much as 100 mm long, and adults were recorded and photographed later in southern Queensland.

We heard the Common Froglet (*Crinia signifera*) at Cooney's Creek, and found specimens at Snowy Swamp and at the Barwick River in New England National Park. This is the tiny frog so familiar in roadside puddles after rain, with a high-pitched, interminable chorus of "saw, see-saw, see-saw, see-saw . . . " The individual calls sound rather like an old-fashioned pocket watch being wound up.

Turning over small logs in dry areas around Bullock Creek in New England National Park, we uncovered numbers of *Uperolia marmorata*, the Yellow-spotted Toadlet (misnamed, in my opinion). In several areas they were in the middle of ant communities, the large ants running freely among them.

This is a small species, rather like *Pseudophryne* in general appearance, but distinguished from it by the active movements and by the orange or orange-yellow patches on the anterior and posterior surfaces of the thigh. The rest of the frog is dark brown above with some darker patterning and a lighter coloured triangular area between the eye and the nostril, and dark grey ventrally with a sprinkling of white spots. They were not calling *in situ*, but I recorded them later in Queensland, and the call is a series of brief notes a little like that of *Crinia signifera*.

While I was photographing these frogs in my van, I noticed that they appeared to attract flies. Several times a fly settled on the frog and the frog snapped it up. There is a glandular secretion which appears to cause smarting when it comes into contact with broken skin. Perhaps the flies are attracted by this or some similar substance.

There were usually a few Brown

Toadlets (*Pseudophryne bibroni*) amongst the *U. marmorata* under the logs. In some individuals of this species the yellow patch on the back of the thigh extended right across the cloacal region; in others there was a distinct, well-separated spot on each thigh. One pair found alone together consisted of one of each type, so this appears to be a variable characteristic even within breeding groups.

On another excursion, Jim located a *Pseudophryne* species which I had never seen before, under stones in a damp culvert off the main road through Gibraltar Range National Park. This was Keferstein's Toadlet (*P. coriacea*) which is confined to northeastern N.S.W. and southeastern Queensland coastal regions. The two specimens were among the red, fallen leaves of a *Callicoma* bush, and the dorsal surface of the toadlets was much the same colour as the leaves. This red area was clearly defined by a broad, black band along the sides. The ventral surfaces were chocolate brown and white in the blotched pattern typical of the genus. Brown and yellow blotching has been recorded for the species, but as in other *Pseudophryne* species, the lighter colour probably varies from white through cream to yellow. One of the toadlets was heard making the rather grating call typical of the genus.

I camped one night at Booralong Creek, about 20 miles north-east of Armidale. There was a storm in the late afternoon, and when the rain stopped drumming on the roof of my van some hours later, the night was full of the sound of frogs.

The number of individuals and species made it impossible to record any single call clearly, which was just as well, as my tape recorder had broken down. I had to content myself with observations by torchlight, walking by the deep pools and wading in the stoney shallows. Six species were identified.

The largest of these was the Green and Golden Bell Frog, (*Hyla aurea*), very beautifully patterned with coppery stripes and blotches on green, with blue-green thighs and groin.

Earlier, by daylight, I had seen individuals sitting half out of water among reeds bordering the creek, but their call until now was unknown to me. Moore described it as "wr-a-a-a-ck, wr-a-a-a-ck". Now I heard it for myself. It was a series of guttural notes uttered in quick succession and sounding to me like "wooh-uh-uh-uh-uh-ah!" rising up the scale a little, with the last note the loudest and sometimes long-drawn-out.

Each calling male floated above submerged water weeds out on the open surface of the larger pools. The vocal sac swelled with each component of the call until finally the throat was larger than the frog's abdomen. The abdomen shrank in size as the vocal sac swelled.

At the other end of the scale, both in size and in the pitch of the call, were the tiny brown "Deepers" *Crinia parinsignifera*—which I had already seen while camped at Dangar's Lagoon hiding in tussocks of grass and sedge bordering the water. We heard it also at Cooney's Creek, together with its relative the Common Froglet (or Brown Froglet) (*C. signifera*), from which it is distinguished by the absence of black and white spotting on the ventral surfaces. The call is a shrill, single note, a rather plaintive "Deep!" varied occasionally by a vigorous "g'dip, g'dip, g'dip!"

Almost as small, but bright green or green with brown markings or occasionally light brown, the Dwarf Tree Frog (*H. bicolor*) clung to grass and reeds both in and out of the water of Booralong Creek, calling a

The Dwarf Tree Frog (*Hyla bicolor*) from New England, N.S.W.

photo: Author.

shrill and far-reaching "y-y-y-y-yip-tip-tip, y-y-y-y-yip-tip!" in chorus every few minutes. The male's throat swells to a little transparent bubble and remains inflated between calls.

Several Banjo Frogs (*L. dorsalis*) called at intervals from under the banks of deeper pools. The Banjo Frog is a large, toadlike, burrowing species, with a brown, warty back, sometimes patterned with darker blotches, the ventral surfaces being blotched purplish-brown and yellow or white. It is readily identified by the yellow ridge behind the eye and the raised, oval gland clearly visible on the tibia of the leg. It is a hard frog to locate and catch at its calling site, but I have caught several at night in the headlights of my van, heading in the direction of water where other males were calling.

The most strident call at Booralong Creek came from Peron's Tree Frog, (*H. peroni*), calling from shrubs and low branches, further from the water than the other species along the creek. This is a medium sized, attractive frog, with tiny, emerald green flecks on the brown dorsal surface, and bold black and yellow markings in the groin and on the ventral surfaces of the thighs. The dark mottled dorsal surface can change to a very light putty colour.

At close quarters the call of this frog can drown out all other sounds. It has been likened to a jackhammer. It is a long, downward-inflected, rasping call, louder at the end, repeated at irregular intervals. Another call is heard occasionally, consisting of a few notes rising up the scale and ending in a loud, nasal "ach!"

This frog does not usually call in chorus, at least not with any discernible chorus structure, and I have never heard so many together before as there were at Booralong Creek. At the height of the evening's activity there was never a moment when one or two individuals could not be heard.

A species which usually does tend to congregate in large numbers, and was well represented at the creek, is *H. verreauxi*, the Whistling Frog. These small brown frogs call intermittently in daylight, and a shower of rain will set them off. They were the most numerous and noisy of the species I heard at the creek, with long, overlapping calls of "quee-quee-quee-quee-cooee-cooee-cooee!" coming from the grass all over the area. This frog has a broad, irregular dorsal band running back-

Blue Mountains Tree Frog (*Hyla citropa*) from New England.

photo: Author.

wards from about eye-level, some dark spotting on the flanks, and areas of bright red on the thighs of some individuals.

We found three other species of *Hyla* in the New England District. *H. booroolongensis*, named after the same Booralong Creek at which I camped, was common in the N.E. National Park, though we found none at Booralong Creek itself. It is a rather squat, featureless species, dark with some indistinct lighter mottling, and reddish-coloured over the posterior part of the eyelid. The call is described by Moore as a soft, slow, "qrk, qrk, qrk", but I did not hear it.

The Leaf-green Tree Frog, *H. phyllochroa*, was found in large numbers on stones in a creek in the N.E. National Park. These small frogs were dark brown when found, but changed to bright green, and the characteristic golden head stripe stood out clearly. This line runs from the nose to the eye and behind it to varying distances along the side of the body. It is bordered ventrally by a darker line. In some specimens in my Sydney garden a brick-red area extends from armpit to groin. Others have this area more yellow in colour, and the New England specimens tended this way.

The call is a quiet, chuckling, downward-inflected "kek-kek-kek-kair, kair, kair-r-r-r-r!" the "kair-r-r-r" sound is sometimes heard alone and very long-drawn-out at the beginning of the evening's activity, or sometimes intermittently on a hot day.

The Blue Mountains Tree Frog (*H. citropa*) is a larger species, very active, with a short, broad head and proportionately large eyes. These individuals too were very dark brown when caught. Three specimens were taken from under stones at Snowy Swamp and a creek in the New England National Park; two later turned dark green and one light brown. There is an unmistakeable white line along the edge of the upper jaw in this species. A golden-brown line runs from the snout to beyond the shoulder, where it breaks up into blotches. There is some reddish-orange colour in the armpits of some individuals, and also in the groin and on both surfaces of the thigh.

* * *

Part 2 of *Frog-hunting up the East Coast*, dealing with the Queensland section of the trip, will be published next month.

Book Review

Eucalyptus Buds and Fruits

Edited by G. M. CHIPPENDALE

Published by the Department of National Development, Forestry and Timber Bureau

Hard cover with dust jacket. Approx. 10" x 7"; 96 pages of drawings. Price—On application to Forestry and Timber Bureau.

Those who have become familiar with what was known as Leaflet 63 of the Forestry and Timber Bureau, and which has been reprinted many times since the first printing in 1952, will no doubt welcome this most recent addition.

One drawback with earlier publications was of course, the soft cover and awkward size. The present book, however, overcomes this.

259 new sketches are included beyond those appearing in earlier printings, and after consultation, it was decided to omit hybrids, doubtful species, and doubtful varieties.

The illustrations of typical buds and fruits, have been arranged according to the order of Blakely's "A Key to the Eucalypts".

Many of the illustrations are from J. H. Maiden's "A Critical Revision of the Genus Eucalyptus", whilst the balance has been handled by five competent artists.

A complete list of specimens from which the drawings were made appears among the first 24 pages, together with an alphabetical list numbered according to W. F. Blakely's "A Key to the Eucalypts" 3rd edition.

The book is certainly one which deals with a specific subject, and for this reason is useful only to certain groups. However, those within these groups be they students, foresters, or botanists, would find a more valuable book difficult to obtain.

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Melbourne's "Canoe" Trees

by Aldo Massola

When Batman first arrived on the Yarra, the tribe which occupied the site of Melbourne and the country stretching from about Cranbourne to Mt. Macedon was the *Woiwurong* (from *Woi* = No, and *Wurong*, = Lip, meaning tongue or speech). This did not mean that they had no speech, but referred to the fact that they were the people whose negative was Woi. In other words, they said Woi for No.

Like all other Victorian tribes, the Woiwurong were divided into a number of sections, each inhabiting a definite tract of territory. The name of the division whose territory was the River Yarra watershed was *Wurunjerri-baluk*, from *wurun*, the river-gum, *jerri*, the grub which lives in that tree, and *baluk*, people. They were thus the River Gum Witchetty Grub People, the name emphasising the fact that they lived mainly where the river gums grew, i.e., the Yarra and its tributaries.

Batman, wanting his famous Deeds signed, had some trouble in contacting the natives. Leaving the present site of Williamstown, he at first ascended the Maribyrnong River, and then cutting across country, eventually caught up with a small group consisting of 8 men and some women and children. In exchange for sundry blankets and knives the men affixed their "mark" to the Deeds, thereby enabling Batman to claim the purchase of some 600,000 acres of land.

This "signing" occurred on the east bank of the Plenty River, to the north-west of Eltham, at about 3 miles above the junction of that river with the Yarra; and not on the banks of the Merri Creek, at the foot of what is now MacLachlan Street, Northcote, where a memorial has been erected.

This, however, is by the way, but it does show that the Wurunjerri in common with all the other sections of the tribe were split into a number of small and widely scattered groups, and that for preference they lived on the creeks and rivers.

After the Settlement was under way, all these small groups gravitated towards Melbourne Town; and because they were "scantily dressed drunken beggars" the missionary and the other officials who were attached to them were ordered to see that the natives did not come into the town, mainly not to offend the prudish mid-Victorian susceptibilities of the fair sex, who would have felt obliged to swoon at the sight.

The natives were thus confined to certain tracts of land, near water and on the outskirts of the settlement, where they set up their mia-mias with bark removed from near-by trees, and made shields and other weapons for sale to Europeans by removing more bark. At these places some of the white inhabitants of the town repaired on warm evenings in their search for diversion after a day's work. Aside from less respectable activities they would sometimes take their families to watch the mock corroborees and sham fights, and the tree-climbing displays staged for their amusement by the "wild blacks" for the sake of some pieces of "white money", i.e. a silver coin, or for some "grog".

The above is tantamount of saying that all the aboriginal trees still extant around Melbourne date after European settlement. This, however, is not quite

correct. I believe that all the genuine canoe trees pre-date white occupation; but that most other "canoe trees", that is the shield and shelter trees, as well as all the "corroboree" trees, are post-European.

It must be emphasised that although generally referred to as such, not all trees bearing bark-stripping scars are canoe trees. The most frequent use of bark was for mia-mias. Since the depth of these lean-tos was about 6 feet, and the height 5 feet, the sheet of bark had be be about 8 feet long and as wide as possible. Moreover, the ends of the sheet were cut square, and not rounded as in the canoe. If this is borne in mind, then the "shelter" trees will be easily recognized.

The second in numerical order are the shield trees. Two kinds of shields were made. One was flat and had an inserted handle. Once having removed the bark, the outline of the shield was marked out on the living wood, and deeply undercut on all sides with a stone axe, until it was loose enough to be forced off with wooden sticks used as levers. The scar on these trees has to be at least 4 feet long and 18 inches wide.

The second kind of shield was only about 5 inches wide and was wedge-shaped in cross section, and its removal left a scar about 5 feet long and 8 inches wide, but quite deep. The scars left by the removal of these shields are easily recognizable because of the size.

The next main use of bark was for dishes to hold the more delicate foods, such as wood-ants, witchetty grubs, and fish. The removal of the small bark platters left an irregular shaped scar. Ants were "cooked" by collecting them on the platter and placing it over the fire. When the ants tried to leave the platter they were driven back by the heat and smoke. After a few minutes of this treatment they would die, and could then be eaten. The grubs were cooked in the hot ashes, and the fish baked in the usual underground native oven. Cooked this way the fish are very tender, and too soft to be held in the hand since they break up. Hence the use of platters.

Somewhat larger irregular scars were left by the removal of bark on which to peg possum skins. These would be fastened to the bark with small wooden pegs or thorns, and when dry were stitched together to make fur rugs.

Next come the roughly circular scars, left by the removal of a "target" by the boys of the tribe. They amused themselves by rolling these discs of bark along the ground to serve as moving targets in toy-spear throwing practice.

Some trees show the scars where a native cut steps to enable him to reach a possum hole. These steps are deep notches penetrating the sap-wood. In rough barks the notches are generally shallower, the climber no doubt using at least some of the rough bark as a foot-grip.

"Corroboree trees" are ordinary trees, and show no marks of any kind. They are in no way related to corroborees, and are not necessary for their performance. Melbourne's corroboree trees simply happened to be close to, and only serve to mark the spot, where corroborees were seen by an earlier generation.

Canoe trees scars are never much less than 8 feet in length, and often 16 feet or more. The width of the scar is always more than 3 feet. For ease of transport, a tree reasonably close to the water was selected, and if possible one with a natural bend, since this made for a deeper hull. The detaching of a canoe was done carefully, and generally entailed the united efforts of several people.

While one was busy marking the

outline of the canoe and cutting the bark with the stone axe, other men or women were engaged in beating the bark all over to loosen it from the tree. The bark for large canoes was kept from falling off and breaking by winding a rope around the trunk while it was being prized off by means of wooden wedges and levers. When detached, the bark was allowed to fall gently by gradually loosening the rope. Sometimes it was necessary to improve the canoe's shape by means of fire or heat, otherwise it was just pegged around its edges to prevent it curling while it was drying. If well cut the canoe could last several months.

Small canoes of the right shape could be used almost immediately, and these were generally made either for crossing a large body of water while on the march, and then abandoned; or for fishing. A forked spear was used for "fishing" in shallow water when the fish were spawning. The fisherman in his canoe would gently float over the fish and pin them to the bottom with his spear. The fish would thus be secured without piercing it, and so spoiling it, much in the same manner that live snakes are caught to-day. Canoes were also invaluable in raiding water birds colonies for the sake of the eggs.

A word may now be said to help the non-specialist to recognize a cut made with a stone axe from one made with a steel axe. The stone axe, even when sharp, was never sharp enough, or heavy enough, nor was the handle long enough, to permit a heavy, incisive blow. Hence the cut is more in the nature of a deep bruise, and is shallow and wide in comparison to the clean, narrow, and deep cut of the steel axe. After a little experience there is no difficulty in distinguishing the blunt cut of the former from the clean cut of the latter.

The removal of the bark left an area which the living bark never completely recovered, but callous growth closed in all around for a few inches over the cut. The tree generally survived the operation.

Before proceeding with the recording of the surviving trees known to me, it is as well to state that I do not claim this list to be complete. These are all the trees known to me, and nothing more. Should anyone know of others, I would be glad and happy to learn of their whereabouts. It will be seen that most of the trees are on the outskirts of Melbourne, on the localities where the Aborigines were congregated in the early days.

The number of trees is contantly diminishing. I knew of trees, for instance in Alma Park, St. Kilda, on the Weatherley Estate, Brighton, and at Reservoir, which have been cut down over the last few years. The dead trunk of a corroboree tree, which stood in the Camberwell Civic Centre, was cut down only recently, (March, 1969). Let us hope that the Council will be good enough to at least erect a little commemorative plaque near where the tree once stood, as was rightly done by the Kew Council when they cut down a tree in Bowyer Avenue. Their plaque states:

> Commemorating the Aborigines and their Craftsmanship. This District, formerly their meeting place, was known to them as "Sand Hill". On this site grew an immense gum tree, from which the Aborigines carved a large bark canoe. This canoe was probably launched on a passing stream, which now flows underground to the River Yarra. 1964.

St. Kilda Junction

An ancient but still living and magnificent gum tree, which grew close to what was once a swamp, can be seen on the north-west corner of the Junction. In the last years of the last century beggarly aborigines could still be seen camping on this reserve. Some

The "Shield Tree", Fitzroy Gardens.
photo: Author.

years ago the St. Kilda City Council had affixed a bronze plaque to the trunk of the tree, stating that "Aborigines of early settlement days congregated and held their ceremonies under and in the vicinity of this tree". Unfortunately the whereabouts of the plaque is not known. It was probably souvenired and sold for scrap metal.

The City Council and the Engineering Department deserve great credit in having spared this tree when re-designing the Junction. Its position was kept in mind when the plans were drawn.

East Melbourne

There is the stump of a gum tree in the Fitzroy Gardens, which bears the scar where a shield, one of the wide variety, was removed. It is a beautiful specimen, and well worth a visit. This stump is quite close to Wellington Parade, but is best reached by walking along the Poplar Path starting at the west end of George Street.

A little further east from the Fitzroy Gardens, but on the opposite side of Wellington Parade, there is Yarra Park, Jolimont. If you park your car at the angle of Vale Street and walk towards the Melbourne Cricket Ground you will see a huge dead gum tree from which bark for a mia-mia was taken, and, a little further on, a living canoe tree, and when close to the Cricket Ground, a living shield tree from which one of the narrow type of shields was taken. The canoe tree, incidentally, bears step marks as well, but these were made with a steel axe.

Richmond

Continuing in an easterly direction we next reach what was once known

"Shelter Tree", Jolimont.
photo: Author.

as the Richmond Pound, then the Survey Paddock, then Richmond Park, now the Richmond Golf Course. It is bounded by Swan Street, Loyola Grove, the Yarra River, and the Horticultural College. On it there are several gum trees, most of which bear scars. Amongst them are at least 4 shield trees, and several "platter" trees, but by far the most important is the canoe tree situated not far from the Horticultural College fence. This is a very old dead trunk, leaning forlornly towards the Yarra, with only the butt of a limb left. But the scar on the trunk is that of a magnificent canoe, at least 15 feet long and over 4 feet wide. The fencing off of the paddock will, I hope, help to preserve it.

On the north side of Swan Street, between Park Crescent and the Yarra, and almost in line with the Hawthorn train overpass, there is another group of trees, all of which bear scars. It is difficult, however, to state with precision what was made with the bark removed from them. The largest trunk amongst them is that of a huge dead gum, raised, as it where, upon an earthen circular pedestal. A sign attached to the trunk states:

"Canoe Tree", and "Steps" cut with steel axe, Jolimont Park.

"Corroboree Tree. This tree has been preserved because beneath it the Aboriginal inhabitants held corroborees which were witnessed by white men in the early days of Settlement of this State."

This sign is painted on a wooden board, consequently no one has thought it worthy of being souvenired! But vandals have repeatedly tried to burn down the tree, I myself once arrived just in time to scatter a fire lit at its base. The Richmond Council is to blame for these attempts, as the ground around the tree is often used as a dump for old branches; and the temptation to set them alight must be strong. Richmond Park was a favourite with the last of the Aborigines and even as late as the first years of this century some could often be seen camped there.

Hawthorn

In the little Yarra-side park on the north-east corner of Bridge Road Bridge there is the upright and straight trunk of a gum tree from which a canoe was taken.

This tree was not always in its present position, but was erected here by the Hawthorn City Council as we learn from an affixed board, which states:

"City of Hawthorn. This tree from which the bark was removed by Aborigines for a canoe was in 1930 removed by the Hawthorn Council from the site where it grew on land originally owned by Sir Frederick James Palmer."

In the year 1852 Sir Frederick built "Burwood", which was later sold to George Coppin, and eventually to

Sir William McPherson, who re-named it "Invergowrie". This home, at 21 Coppin Grove, Hawthorn, is now the Invergowrie Homecraft Hostel. The tree was removed from the Hostel's grounds and donated to the Council.

The little Yarra-side park, however, can claim an aboriginal tree of its own: within 50 yards of the canoe tree there is a still-growing gum from which the aborigines removed bark for a wide type shield. It is a perfect scar, but although the callous growth has covered the axe-cuts so that it is difficult to say whether a stone or a steel axe was used, it appears to me by the general contour of the scar that it was a steel axe. It would thus have a post-European date.

Heidelberg

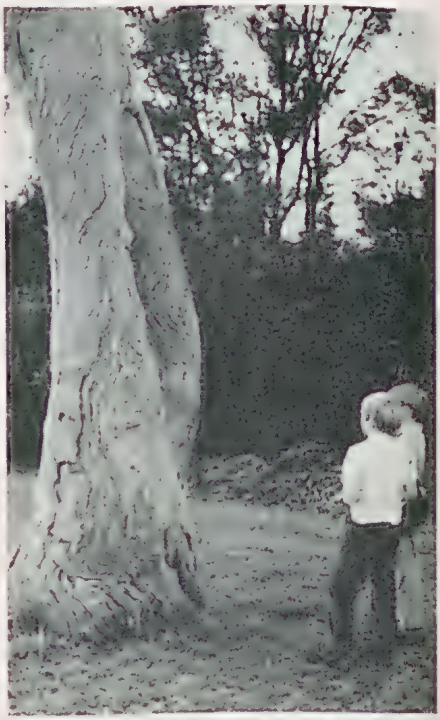
On top of a rise known as "The Outlook", Eaglemont, there is a little reserve, Outlook Reserve. It is between Outlook Drive and Summit Drive, but it is hard to find, being surrounded by houses. Its only access is through an easily missed lane in Summit Drive. On the reserve there is a large dead gum tree, from the bent trunk of which the Aborigines cut a canoe at least 12 feet in length, and, judging by the angle of the bend, of good depth.

Around the trunk and across the face of the scar there are several cuts made with a steel axe. This axe, however, was wielded at a later date, and mainly to enlarge a hollow at the base of the tree, probably in order to reach a rabbit or a fox which had made it its home.

Recent reports indicate that the Heidelberg City Council will shortly begin work to preserve the tree by cementing the hollow at its base and erecting a fence around it. The tree will also receive a tin "cap" to prevent water infiltrating into, and rotting, the trunk.

By this short survey it can be seen that except in the reserves where the Aborigines were confined, and along the course of the Yarra River, there is a scarcity of Aboriginal trees around Melbourne. This, of course, is due to many having been cut down; but at the same time their number was probably never great. The aborigines lived mainly on the water courses where also grew the larger trees which they needed; but the larger trees were also needed by the early colonists for building material.

The surviving few are on public land. They are important relics of Melbourne's pre-history, in fact, the only monuments to the Wurunjerri-baluk, and it is gratifying to see that the City Councils on whose land they occur are generally disposed to protect them, since this will insure their preservation.



"Canoe Tree", Outlook Drive, Eaglemont.
photo: Author.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature, Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Black Swans

At Healesville, Sir Colin Mackenzie Sanctuary, several years ago I watched a pair of swans building a nest, assisted by three young birds from their previous year's clutch.

The female sat on her partly constructed nest, on the edge of the water, while the male and the three young worked out on the water. These three young were at a distance of six to ten feet from the nest, facing outwards, and they were "fishing" for sticks on the bottom. When a stick was located it was lifted out and passed backward over the body and dropped into the water behind it, at the full extent of the bird's neck. These three young birds were working roughly side by side, about two or three feet apart, with their tails towards the nest. The male bird occupied the position between the nest and the young birds, and as one of them dropped a stick back within range of him (the male) he took it and similarly passed it back and dropped it near the edge of the bank. The female stretched down from her position and retrieved the stick and fitted it into the nest. This procedure was carried on for a couple of hours, and the birds kept their respective positions all the time, presumably until they could find no more sticks. The young birds appeared to co-operate willingly, and I saw no evidence of the male forcing them to work in any way.

Any Wolves?

First repsonse to the note in the *Vict. Nat.*, June, 1969, regarding the future of Naturalists' Clubs, came from Mr. R. J. McKay of Western Australian Museum, Beaufort Street, Perth 6000.

He says: "My interest is a systematic revision of the Wolf Spiders . . .

The distribution of these spiders is little known and almost nothing of life histories. Collection is easy with a head torch at night and study will prove very rewarding. I shall identify any mature Wolf Spiders for club members".

Note: Some are plentiful about Melbourne. Specimens could be shown in meetings. "Diamonds" on gravel roads shining in the light of the car headlights should be investigated. Carry a jar and card for capture.

Mutton Bird Deaths

This tragic note comes from Dr. D. R. Blake of Heidelberg in Victoria.

Just before Christmas 1968, I counted 8 dead mutton birds on a half-mile or so of the Airey's Inlet Beach. They appeared to have died over an extended period some being quite recently dead, others nearly skeletons. The cause of death was not obvious, and some appeared to be quite young birds. I thought this number to be rather more than might be expected from casual death in that area and was watching a week or so later whilst we were in the Tathra region, near Bega, in N.S.W. Here I was appalled at counting over 100 dead birds on 2-300 yards of beach and this average was at least maintained if not exceeded over most of the full length of the beach —more than one mile. My wife counted 50 birds in about 100 yards at nearby Moon Bay, and quite a number were evident at Penders beach, also in this region, although I did not count them. I was, however, very relieved to find no dead birds on the Cape Everard beaches in East Gippsland.

I have been out of Australia for several years, and I do not know whether the reason for these deaths of mutton birds has been established; one cannot help wondering whether insecticides are involved. Perhaps you could enlighten me?

Apart from the fact that oil-clogged plumage may be part of the reason; I believe that lack of food in the form of zooplankton may also contribute to such deaths of Mutton Birds. [Ed.]

Field Naturalists Club of Victoria

F.N.C.V. General Meeting

14 July, 1969

An extraordinary meeting was held at the beginning to consider affiliation of Latrobe Conservation Society. This was approved on the motion of Mr. J. Baines and Mr. W. Woollard.

The Herbarium Hall was full and the president, Mr. E. R. Allan, was in the chair.

The President announced the death of the F.N.C.V. Vice-President, Mr. R. W. McKellar, O.B.E., J.P. The said that Mr. McKellar had also been Chief Commissioner for Victoria of the Boy Scouts, after being active with the movement for many years. He was a major in the 2nd World War, and in 1968 was awarded the O.B.E. He was associated with other organizations connected with the printing trade. Members stood for a minute in silence in respect to his memory.

Eight new members, whose names appear in the July *Naturalist*, were elected on the motion of Mr. A. J. Swaby and Mr. T. Sault.

A letter was received from the A.D.C. to the Governor, saying that Sir Rohan Delacombe will attend the Nature Show on 1 Sept.

The Secretary announced that the Blackburn and Doncaster Tree Preservation Societies are having a Native Plants Show on 11 and 12 Oct., in the Blackburn High School, corner of Springfield and Williams Roads.

On 27 July, the Bird Observers will have a tree-planting excursion to the You Yangs. Many trees were destroyed in the fires of 1968.

Mr. A. J. Swaby stressed the need to work for Naturalist Clubs. He said that Mr. McKay of W.A. Musum has asked if any members can collect Wolf Spiders and send them to him for identification. Mr. J. Strong will supply details.

The subject for the evening was "Field Trips in South Africa", by Mr. Roy McLister. By means of beautiful colour slides, he described his 10,000 miles safari, beginning at Cape Town and visiting the Cape Point Nature Reserve, stocked with animals that do not kill, such as zebra and "bok".

Pictures of masses of colourful wild flowers there, and on Table Mountain, included introduced wattles and gum trees. Caledon National Park showed weaver birds and their nest. Magnificent proteas such as King Protea and *P. cynaroides* (the national emblem), Strelizias, and the introduced flourishing Waratah were shown. Numerous water birds, including flamingos, were to be seen en route to Durban. The strangest desert plant had a bulgy, animal-like body, with short bulgy branches bursting unbelievably into grapevine leaves and, indeed, producing real grapes—a species of Vitus. Large cactus-like plants in flower, flamboyant trees, a Cycad with large, red edible seeds, masses of red, pink and white Mesembryanthemum, and numerous "daisy" types were seen; and a fine slide showed Zulus in Natal.

In the Hluhlowe game reserve, zebras monkeys, white rhinoceros, buffalo dung beetles rolling their cricket ball size treasure, and a big "Cabbage-tree" were shown. In this reserve, the visitor begins the day at 5 a.m. to see the sun rise.

The Kruger National Park of 200 miles by 40 miles showed elephant and a pride of lions. It had been damaged by bad fires and spoiled by tourists.

Victoria Falls, one mile long and 350 feet deep, on the Zambesi River, presented a magnificent sight in several slides taken from different positions. Many hippopotamuses were in the Zambesi River.

From Rhodesia the remarkable tree, *Andansonia digitale* and the beautiful *Leucospermum cardifolium* made striking pictures.

In the Cape of Good Hope National Park, ostriches with their young were shown.

The President thanked Mr. McLister for the all too short talk, and members showed their appreciation by acclamation, and their interest by numerous questions.

The Secretary said he had received a letter from the Ingram Trust approving the use of $262 for printing the Show pamphlets depicting the Western Whipbird. He had also received a letter from Mrs. Kath. Davies asking for support in protesting to the Mordialloc Council against the proposed boating marina costing $1,000,000, which would destroy the most beautiful part of the coast and a fossil bed. The better spot for a marina would be behind the hotel near the river. Regret was expressed that the Port Phillip Authority was not controlling this destruction.

A letter was also received concerning the making of an aquatic sports area at Mooroopna, which would destroy a sanctuary for water birds, and white and straw-necked ibis rookeries. The Council will find out more about it. Mr. Woollard suggested referring the matter to the Bird Observers' Club also.

Mr. J. Strong spoke of a letter he had received from Kangaroo Flat asking about the habitat of the witchety grub, the method of collection by aborigines, manner in which the egg is deposited and seasonal distribution. Any members with information on these were asked to see Mr. Strong. Mr. Ross Garnet said they were often in Casuarinas as well as Wattles.

The Secretary announced that Fisheries and Wildlife officers are building a tower on Seal Rock (near Phillip Island) to observe seals. This will be demolished as soon as the survey is finished.

A discussion of means of cutting costs in producing the magaine will be considered by Council. Mr. F. Zerkler, Miss Young and others presented ideas.

The Secretary recalled an *Age* recent review of a book by Eric Rolls, "They All Ran Wild", $6.75, telling of introduced pests, and the work of Acclimatization Society of 1860, which had even considered introducing monkeys — "baboons in gum trees".

Exhibits

Mr. A. J. Swaby brought a blue *Hakea lehmanniana*, from W.A.

Mr. T. Sault: Azolla and pond life shown under the Binocular Club microscopes and a white fungus (like insect eggs) on rotting wood.

Mr. K. Strong showed sea urchin spines and teeth from "Aristotle's Lantern" under the microscopes.

Miss Ann Forbes brought fruiting *Banksia serrata*, from Yanakie.

Mr. H. Haase showed flowering *Banksia integrifolia, B. ericifolia* and *B. collina*. He reported that cats, dogs and foxes cause damage in his Bayswater garden, and the disappearance of thornbills due to cats taking the young birds from nests, has prevented the pollination and seeding of wattles and other natives.

Mr. J. Baines reported a visit to Monash University Open Day with its exhibit of Little Desert ecology, including the adptation of the Mallee Marsupial Mouse to the absence of water. He emphasized the work of the late Professor Jock Marshall in establishing the reserve which is thriving and includes Cape Barren Geese and Emus; and where experiments are going on. He commended the plantations of native trees and shrubs around the university.

Mr. Fairhall spoke of the Botany Group visit to Maranoa Gardens where fity-six Grevilleas, six acacias, six correas and four banksias were in bloom.

The subject of the evening and the speaker for the next meeting on 11 August will be "Seals of Westernport", by Mr. R. N. Warneke (Senior Research Officer with Fisheries and Wildlife Department).

Miss White: A stone fly from Old Black's Spur Road and some crusader bugs.

Miss J. Forse described how to do plastic embedding of insects, etc., using a ping-pong ball as a mould.

Geology Report

2 June, 1969

The meeting was attended by twelve members, Mr. R. Condron being in the chair.

Annual Election of Office-bearers

Nominations were called for Office-bearers. Mr. R. Condron was nominated by Miss White. seconded by Mr. Kelly, as Chairman. Mr. J. Strong, nominated by Miss White, seconded by Mr. P. Kelly, as Secretary. As there were no further nominations, the above were duly elected for the ensuing year.

Dr. Brian Smith offered to lead an excursion on a Saturday afternoon to the Museum for the purpose of seeing the collections (date to be decided). Dr. Smith also reported that he would have further information about activities of other Marine Biology Groups, which are going to combine with this Group to prepare an exhibit for the Show.

Exhibits

Mr. McInnes. — Three stereoscopic micrscopes which had been purchased for the Club. He explained that these were for use both at General meetings and Group meetings by any member having anything to display. Mr. McInnes had adapted these instruments so that they could be used with transmitted light; also dark-ground if desired. Mr. Strong commended Mr. McInnes on the excellent manner in which he had arranged the dark-ground lighting, which gave a

splendid sharp resolution. Shown under these miscroscopes were a nudibranch collected at Rickett's Point; a species of polychaete worm; a species of the limpet *Cellana tramoserica*, inverted to show gills and mantle; a small millipede; two moth larvae (unidentified); and an unidentified pupa.

Mr. Condron stated that he had been to San Remo where he saw quite a few Wanderer Butterfiies, of which he was able to tag sixteen.

2 *July, 1969*

Twenty-five members attended with Mr. Dodds occupying the chair.

Reports. Mr. McInnes reported on the June excursion to Korkuperrimal Creek led by Mr. J. Myers of Myrniong. The Council trench was the first locality examined. Fragmentary plant remains of Triassic age were obtained. Several hundred yards north-west at Morton's Quarry, fragmentary plant remains were also found, this time of Permian age. Further west Main Quarry was examined. This quarry provided sandstone for building purposes. The party then went along Korkuperrimal Creek examining the basalt flows. These were many and varied; some fine grained and some porphyritic, with phenocrysts of Olivine and Augite. A fine-grained Monchiquite dyke was also examined.

The evening took the form of a Members' Night. Several members contributed, Mr. McInnes beginning by explaining what was to be seen in rock sections he showed under the microscope. Mr. Blackburn showed slides of geological features. Perhaps the two most interesting were of type sections that have been preserved, we hope, for posterity.

The first was of Silurian strata in Moonee Ponds Creek, near Ormond Road. The second was of Tertiary deposits at Northcote.

Mr. Dodds showed slides of the cliffs between Port Campbell and Peterborough. These showed the remarkable sculpture caused by wave action on the calcareous standstone. Other members spoke at length on their exhibits.

Exhibits

Mr. Dodds: Magnesite, Heathcote. Marble, Italy. Fossilized Whale Vertebrae, Dunkeld. Galena and Mica.

Mr. McCay: Nephrite, Rhyolite, Great Barrier Islands, N.Z.

Mr. Blackburn: Stibnite, Stibiconite, Berthierite, Yarra Glen.

Marine Biology and Entomology

5 May, 1969

Twenty-one members attended this meeting which was chaired by Mr. Condron.

The Secretary read a letter from the President of the Club informing him that a decision had been made, on the suggestion of Mr. Swaby, that a Liaison Officer be appointed from each Group for the purpose of more active co-operation between the F.N.C.V. and affiliated Clubs, the latter being in country areas.

Mr. McInnes spoke briefly on the Groups's exhibit at the forthcoming Nature Show.

Dr. Brian Smith suggested that members of the various Marine Clubs work together toward a display under the heading of Museum. Dr. Smith is to be responsible for the work to be carried out. Mr. McInnes suggested that we could have a display of marine life collected at Rickett's Point.

Guest speaker for the evening was Mr. H. B. Wilson, Senior Entomologist, Burnley Horticultural Gardens. His subject was "Locusts and Grasshoppers".

Mr. Wilson started his talk by explaining the difference between the two classes. He went on to describe various species of grasshoppers; told us their history, and differentiated between the harmful and harmless species of each class. As usual, Mr. Wilson gave the Group a a most interesting and informative talk. At its conclusion many questions were asked, and a vote of thanks was moved by Mr. McInnes,

Exhibits

Mr. McInnes described how he had taken the Hawthorn Juniors on an excursion to Rickett's Point for the purpose of conducting a marine survey of that area. Among other things, eight different species of fish were taken; also some sea centipedes.

Miss Dixon: A spider which she brought for indentification, taken from her garden.

Mr. K. Strong: A fossil shark's tooth, locality from which taken unknown.

Mr. R. Condron: Larva of the small Orchard Swallowtail Butterfly, locality Yapeet; a Dingy Swallowtail; some species of Phasmas—a crane fly from Mt. Donna Buang; two long-horned grasshoppers, also from Donna Buang; and a species of longicorn beetle from Mallacoota.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 11 August—General Meeting in National Herbarium, The Domain, South Yarra, at 8.00 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for evening—"Seals of Westernport", by R. N. Warneke, Senior Research Officer (Fisheries and Wildlife Dept.).
4. New Members—
   (a) *Ordinary:*
   Mr. A. J. Brook, 42 Hoddle Street, Essendon 3040.
   Mr. R. G. Kerr, 10 Minto Street, East Kew 3102.
   Miss G. Piper, 30 Wattle Valley Road, Canterbury, Vic. 3126.
   Country:
   Mr. N. Macfarlane, Kooloonong, Vic. 3574.
5. General Business.
6. Nature Notes and Exhibits.

Monday, 8 September—"The Coolart Story", by Mr. W. Davis.

Group Meetings

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 14 August—Botany Group. Subject, "Wildflowers of Western Australia" by Dr. Elizabeth Turner.

Wednesday, 20 August—Microscopical Group.

Friday, 29 August—Hawthorn Jun. F.N.C. at Hawthorn Town Hall—Birthday Night.

Monday, 1 September—The Marine Biology and Entomology Group will not meet this month owing to the Nature Show being on the same night.

Wednesday, 3 September—Geology Group.

Thursday, 4 September—Mammal and Survey Group meeting at Fisheries and Wildlife Dept. Library Rooms, Flinders St. Extn., at 7.45 p.m.

Friday, 12 September—Montmorency Jun. F.N.C. at Scout Hall, Petrie Park.

F.N.C.V. EXCURSIONS

Sunday, 17 August—Trentham Falls and Blackwood. This excursion will be led by Mr. B. Fuhrer and will join forces with the Geelong Field Naturalists from lunchtime onwards. The coach will leave from Batman Avenue at 9.30 a.m., fare $2.00. Bring one meal (to barbecue if desired) and a snack.

Friday, 29 August-21 September—Western Australia. Members going should have itineraries by now and all fees should be paid. Members are reminded that the train leaves at 8.40 p.m. Please keep luggage to a minimum as the bus will need unloading and reloading frequently on this trip. Suitcases can be booked through to Perth in the brakevan, but an overnight bag will be needed on the train and this should contain anything required between Perth and Jurien Bay, as we embus at the station.

Friday, 26 December-Sunday, 4 January—Mt. Beauty. A coach has been chartered for this excursion and will be used for day trips to the Bogong High Plains, Mt. Hotham. Accommodation has been booked at the Mt. Beauty Chalet at $6.00 per day for dinner, bed and breakfast, and picnic lunches can be obtained for 50 cents. Members should pay for accommodation individually, but the bus fare of $20.00 should be paid to the excursion secretary by the November general meeting, all cheques to be made out to Excursion Trust.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

President:
MR. E. R. ALLAN

Vice-President: MR. T. SAULT

Hon. Secretary: MR. D. LEE, 15 Springvale Road, Springvale (546 7724).

Hon. Treasurer: MR. D. E. MCINNES, 129 Waverley Road, East Malvern 3145 (211 2427)

Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg 3084.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra 3141.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: MRS. N. E. LEWIS, 1 Billing Street, Springvale 3171. (546 4649).

Sales Officer: MR. B. FUHRER, c/o National Herbarium, The Domain, Sth. Yarra.

Group Secretaries:

Botany: MISS M. BUTCHART, 23 Loch Street, Hawthorn East 3123 (82 1616).

Geology: MR. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073.

Entomology and Marine Biology: MR. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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F.N.C.V.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 8 September—General Meeting in National Herbarium, The Domain, South Yarra at 8.00 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for evening—"The Coolart Story", Mr. W. Davis.
4. New Members—
5. General Business
6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 11 September—Botany Group Meeting.

Wednesday, 17 September—Microscopical Group Meeting.

Friday, 26 September—Hawthorn Junior F.N.C. Meeting at Hawthorn Town Hall at 8 p.m.

Wednesday, 1 October—Geology Group Meeting.

Thursday, 2 October—Mammal Survey Group Meeting in Fisheries and Wildlife Rooms at 7.45 p.m.

Friday, 3 October—Preston Junior F.N.C. meeting in Rechabite Hall, 251 High St., at 8 p.m.

Monday, 6 October—Entomology and Marine Biology Group Meeting.

Thursday, 9 October—Botany Group Meeting.

Friday, 10 October—Montmorency District Junior F.N.C. meeting in Scout Hall Petrie Park, Montmorency at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, 21 September—Churchill National Park. Leader Mr. F. Zirkler. The coach will leave Batman Avenue at 9.30 a.m. fare $1.50, bring one meal. Please make bookings for this excursion direct with the leaders as the excursion secretary will be on holidays.

Friday, 26 December to Sunday, 4 January—Mt. Beauty. A coach has been chartered for this excursion which will remain with party for use in day excursions to the Bogong High Plains, Mt. Hotham and other places. Accommodation has been booked at the Mt. Beauty Chalet for the coach party at $6.00 per day dinner, bed and breakfast with picnic meals available at 50 cents. The inclusive coach fare of $20.00 should be paid by the November general meeting to the excursion secretary all cheques being made out to Excursion Trust. Accommodation to be paid for individually.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

F.N.C.V.

Vol. 86, No. 9 4 September, 1969

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Front Cover:

Reproduced here is one of Mrs. Edith Coleman's photographs of the echidna named "Prickles". The story of "Stickles" and "Prickles" appeared in the *Vict. Nat.* for October 1938.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature, Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Crimson Chats

W. Denny of Lavers Hill Victoria writes—

Mr. Chisholm mentions in his Bright days in Birdland having observed the Crimson Chat in Maryborough (Vic.) last October. He thinks it may be the most southerly record for this bird.

However I think I can claim that, with an observation last December (1968), I saw a male bird at Marengo, a small village about 2 miles south of Apollo Bay on the Ocean Road, and as the crow flies, approximately 5 miles from Cape Otway, which is the second most southerly part of Australia. Wilson's Promontory is the first.

The bird was clearly seen and I am almost sure the female was there too, but I caught only a glimpse of her and it was before I saw the male and I concluded it was a beautiful firetail.

I was at Round Hill Reserve and had as my travelling companion from the Congress (R.A.O.U.) at Canberra Mr. Winston Filewood of New Guinea. We saw the birds often at Lake Cargelligo and attempted to photograph the nest; this was in October and November 1968.

Strangely enough had one substituted Lake Cargelligo's expanse of water for the Southern Ocean, the habitats were almost identical. The site is the Apollo Bay rifle range, there are clumps of bramble dotting the long dry grass right to the water's edge.

I first saw these birds out of Broken Hill when I drove Gordon Binns (R.A.O.U.) (general secretary and past president) there to see the wedge bill and am perfectly familiar with them.

A new bird for one's district is always a thrill, I was most excited at my discovery.

Brush Turkeys

Mr. W. R. Gasking, who wrote the notes on Black Swans in these columns last month, also sends these notes.

One warm day at the Sir Colin Mackenzie Sanctuary at Healesville, I was watching the Brush Turkey male. He had a large, well heaped mound, and appeared excited—running about the aviary, chasing the hen whilst she remained on the ground, and often lightly scratching the top cover of the mound. I suspected that a hatching was imminent, so waited. Already, a number of chicks had hatched.

Presently I became aware of a strong perfume not unlike lemon essence. This was only noticeable for a short time, but during that time the male bird was extremely excited. There was no sign of movement from the mound; which may have indicated an emerging chick. There was no wind at the time, which may have carried the perfume to the area. I unsuccessfully searched around for the source. Returning to the aviary on the other side, I again noticed it, and saw that the bird was excited. No plant was in flower nearby, which could have accounted for the scent.

Presently I was called away for an hour or so; and upon my return the male had quietened down and was quietly scratching; while a newly emerged chick perched on a branch, about five feet above the ground.

I often wonder if a connection exists between the perfume, and the emergence of the chick. Perhaps it stimulates the male into an aggressive attitude towards intruders whilst hatching takes place.

Can any other reader comment upon this?

[Although birds have nostrils, it appears that their sense of smell is poorly developed; and to rely on such a sense for an indication of an important event seems unlikely. Perhaps the untimely presence of a human caused the excitement. (Ed.)]

Frog-hunting up the East Coast
Part 2

by Densey Clyne

My next stop was at Gin Gin, west of Bundaberg in Southern Queensland. The Council Rest Area where I camped was close to Gin Gin Creek, and bordered on one side by an extensive grassy swamp.

At dusk, when I arrived, numerous Dwarf Tree Frogs (*H. bicolor*) were calling from grass stems and twiggy plants, clearly silhouetted against both the evening sky and its reflection in the water. This little frog is very variable in the proportions of green to brown skin colouring; the skin is usually smooth, but here I found two specimens with small raised warts or pimples scattered lightly over the dorsal surfaces. The call appeared similar to those of the New England District.

By nightfall, it was clear that the swamp was a habitat for a vast number of frogs of several different species, and I spent three or four hours wading about with a torch. The water was nowhere more than 15 inches deep, and apart from reeds and grass there were clumps of thicker vegetation partially submerged, and paperbark and eucalypt trees around the edges.

From the grass among trees around the drier borders of the swamp, came single, repeated notes, rather like the call of the Common Froglet (*C. signifera*) but a little shorter and lower-pitched. The tiny frogs were very hard to locate, a call invariably seeming to come from several feet ahead when I was in fact almost treading on the caller. They were concealed in shallow hollows in the dry earth under grass and debris, and the dark inflated vocal sacs of the calling males were not easily picked up by the torch beam. These frogs turned out to be the Yellow-spotted Toadlet (*U. marmorata*) and this was the first time I had heard their call.

A small group of Brown Frogs (*L. peroni*) could be heard in soft chorus around the edges of a clear pool, and in the distance, the twanging notes of several Banjo Frogs (*L. dorsalis*).

At dusk I had heard a shrill, long-drawn-out bleating call a little like that of Keferstein's Tree Frog (*Hyla dentata*) coming occasionally from the trunks of Eucalypts around the rest area. Now, in the dark, the calls came from every part of the swamp, close to the water. There must have been scores of individual frogs, and the entire chorus appeared to resolve itself into alternating high and slightly lower calls. The inflated vocal sacs of the calling males were almost transparent.

This species was identified later as *H. rubella*. It is a small, light brown frog, unpatterned except for a broad, darkish, diffuse band which runs along the flanks. A smaller stripe may run forward on either side from the groin up towards the midline, and also a faint broad band of the same darker colouring down the centre of the back.

In its call, its general body proportions, and the characteristic twist of the head on the rather long body, this frog resembles *H. dentata*. It is interesting to note that round about the N.S.W./Queensland border it appears

to take over from *H. dentata*, which occurs south from there to the Jervis Bay area.

From a paddock across the highway, I heard a call every now and then which at first I took to be Peron's Tree Frog (*H. peroni*) warming up—a few loud, clear notes, descending the scale. However, it never became the long, jackhammer call that I expected, and I was unable to find the caller.

My most interesting encounter that night was with the Rocket Frog (*H. nasuta*). A series of calls was coming from some partly submerged shrubs at a distance from me; they started quietly and worked up to an excited yapping sound which came in irregular, rapid bursts, and continued long enough for me to approach and see the caller. I had never seen the species before, but it was easy enough to identify—a small, streamlined frog, with dark brown longitudinal stripes on a light background, it sat on a partly submerged log pointing at an angle to the sky the unmistakeably long snout that gives the species its common name. This frog belongs to the *H. lesueuri* group, some members of which are very difficult to distinguish apart, but no other species of *Hyla* in Australia has such a long snout as the Rocket Frog. The body measures about 40-50 mm from snout to vent.

The only other species in the swamp was identified by its call the next morning, though I did not see it—the Striped Marsh Frog (*L. tasmaniensis*).

Early next morning, Eric Zillman, well-known local naturalist, turned up in his Landrover and offered his help, and we drove around the area to look for further species. *L. tasmaniensis* and *L. peroni* were calling around the edges of paddock ponds. We found numbers of *H. rubella* clustered under the bark of logs and trees, but the most interesting find was a group of frogs under the bark of some tree-stumps left standing in a swampy paddock. At first sight I exclaimed "Hyla peroni!" but some aspects of the frogs immediately puzzled me. The general colour was mottled brown, sometimes changing to plain putty colour. In the groin and hidden thigh areas were the bright yellow and black pattern of *H. peroni*. But the tiny emerald green specks found on the dorsal surface of the latter were missing. The eyes of *H. peroni* are rather remarkable, being large and protuberant, and showing, in daylight, an unmistakeable cross at the centre of the golden iris. These Gin Gin frogs not only lacked the cross, but the upper part of the iris was bright red! The Australian Museum later identified them tentatively from photographs as *H. rothi*, a close relative of *H. peroni* which perhaps replaces it in the north. I wondered if the *H. peroni*-like calls heard the night before could have been those of this species.

That night, Eric called for me again and we drove across country in the landrover three miles upstream to where Gin Gin Creek ran between steep banks through scrub or rain-forest. We left the landrover and stopped for a few minutes by a narrow stream bordered by grass and bog, where I recorded a group of Rocket Frogs. Two males of this species calling alternately make a sound like a saw; several together make an excited gobbling noise like the word "double-u" repeated faster and faster. Bursts of calling last for a few seconds, to be repeated after a long pause.

Eric had told me about mysterious, loud frog calls he had heard previously in the vicinity of the creek, and as we moved into the rain-forest, we heard in the pitch darkness a single, deep, resonant "Wahk!" from the bank high above the water. This was echoed by

other frogs spaced well apart on the floor of the rain-forest, which was covered by a litter of large, crisp leaves. Our torches revealed nothing; we moved up the bank and tried to pinpoint one of the calls, but our footsteps on the dry leaves silenced the callers too soon.

We settled down to wait, and after a while the calls started up again in the distance. I switched on the tape-recorder, but it was not sensitive enough. Then apparently from right underneath us came a loud, clear "wahk!" which was repeated by several other frogs close by. I recorded them for a few minutes, but we still hadn't seen anything of the frogs themselves, though we cleared away a large section of leaves and debris. But later Eric spotlighted a pair in amplexus (the mating position) a few yards away, and I was able to identify the species as *Mixophyes fasciolatus* the Great Barred Frog.

This is a large, handsome species. up to 100 mm in length, yellow-brown in colour with yellowish sides blotched dark brown. The legs are strikingly patterned with dark brown triangular bars, and the arms are similarly but not so clearly barred. A dark stripe begins at the snout, narrows towards the eye and continues from behind the eye over the distinct tympanum or eardrum. The eye is very dark. This is one of several very similar *Mixophyes* species found up the coast. We captured two more specimens, which I photographed later.

On the way back to the landrover we caught several very active, bright yellow frogs of the *H. lesueuri* group, with rather pointed snouts. These were never identified satisfactorily from the specimens, but from photographs were later thought to be *H. lesueuri* itself, though they appeared to me to lack all the relevant colour patterns and to have too long a snout. They were so active that they got loose several times in my van and I found them down the bed in the morning, luckily unsquashed.

Then on the sandy shore of the creek Eric found two fat little frogs, attractively patterned in shades of brown with red specks. I was a little baffled by these; that they were burrowing frogs was obvious from the shovel-

Rana daemeli
(See text page 270)

photo: Author

shaped metatarsal and metacarpal tubercles, and they appeared to swell considerably when placed in a container with water, as though capable of aestivating. Next day Eric took me to a property where a load of sand had been dumped by a water trough. He remembered having seen some small frogs being dug out of the sand. Sure enough, he dug out a couple more, and they were the same species as those of the night before. They turned out to be *L. ornatus*, the Ornate Burrowing Frog, a relative of the three other *Lymnodynastes* species encountered on this trip, but very different in appearance.

I drove on up to North Queensland, and my first trip from Cairns was made a few days later with David Cassels, a young member of the North Queensland Naturalists' Club. He had volunteered to show me some little frogs I was keen to photograph and record, and knew exactly where to find them. We drove up into the mountains, turned north towards Mossman, and then left the road to follow a timbermen's route through the jungle high up on a mountainside, 70-odd miles from Cairns.

I parked the van, and David showed me a way down the steep bank of a creek that flowed swiftly between boulders of wet, black rock. "Listen!" said David, and I heard above the rush of many small waterfalls a rapid, metallic "tink, tink, tink, tink, tink, . . " like a spoon tapped against a glass.

As soon as we reached the creek, David bent and picked something up from the edge of a shallow pool full of tiny leaves that had fallen from the dense trees above. "This is it," he said, and so it was—*Taudactylus acutirostris*, which I immediately christened the Tinker Frog. The specific Latin name means "sharp beak", and this species has an even more acutely pointed snout than *H. nasuta*; it is so long that the nostril is halfway between the eye and the tip of the snout. It is not, of course, a "tree frog"; and it is much smaller than *H. nasuta*, the female measuring about 30 mm and the male a little less.

Several males were calling, but as they seemed to prefer niches behind or

Continued on p. 269

Taudactylus acutirostris the "Tinker Frog".

photo: Author

Book Reviews

The Life of the Emu

by MAXINE EASTMAN

Angus & Robertson 1969, 72 pp. 87 b and w 12 coloured photographs and line drawings. $4.50

The author is an American who travelled extensively over much of Australia with her husband Bill Eastman, Jnr. when collecting material for his book "Parrots of Australia" of which he was joint author with A. Hunt of Inverell in New South Wales. This is a book of a collection of photographs taken by Mrs. Eastman on her travels, of a bird which must have attracted her immensely—the Emu.

The chapters cover quite a variety of subjects such as Importance of Water, Nesting and Courtship, Looking after the Young, Emus and Aboriginals, and their Territory.

Written in a popular style and well illustrated this is a very good book for both the child and the adult.

A Handlist of the Birds of South Australia

by H. T. CONDON

2nd Edition Published by the South Australian Ornithological Association 1968. 141 pages, 4 maps, 4 photographs and 2 drawings. $3

Mr. Condon has revised and enlarged the Handlist to make it an excellent ornithological publication covering the bird species that are listed for South Australia, some 423 native birds.

Mr. Condon's work has involved all the latest trends of taxonomy and this up-to-date standard is quite different in most cases to the Official Checklist of the Birds of Australia published by the Royal Australasian Ornithologists Union in 1926. Mr. Condon however is now working on a new R.A.O.U. Checklist and this South Australian Handlist could well point the way for things to come.

His grouping of the Yellow Rosella with the Crimson Rosella may not meet the approval of some ornithologists, but taken all round Mr. Condon has put a tremendous amount of thought and research into this Handlist and it is undoubtedly a worthy addition to the outstanding works on Australian Ornithology.

Roy Wheeler, Windsor, Vic. 3181

Australian Wildflowers in Colour

Photographs by DOUGLASS BAGLIN, text by BARBARA MULLINS

Syd., A. H. and A. W. Reed, 1969. $3.95. Hard cover with dust jacket. Approx. 7" x 7½". 112 pages.

Douglass Baglin and Barbara Mullins have collaborated several times to produce books on Australian flora, e.g. Australian Eucalypts and Australian Wattles. Mr. Baglin is a well-known commercial photographer noted for the clearness and exacting detail of his work. Barbara Mullins, a journalist, is a co-author of the popular book for the home gardener Designing Australian Bush Gardens. Their latest effort, Australian Wildflowers in Colour,

(*turn to page 275.*)

Further Investigations in the Kent Group

by M. A. Marginson and S. Murray-Smith*

The Kent Group of islands is situated in Bass Strait, approximately half-way between Wilson's Promontory and the northern tip of Flinders Island. It consists of five islands, only one of which, Deal Island, is inhabited (by two lighthouse families). Deal Island is also the largest of the Group, at the widest extent measuring four miles by three and a half miles. It rises to about one thousand feet, and the upper slopes are covered by low forest growth, though much of the island is grassland, formerly grazed. The Australian Conservation Foundation has approached the Commonwealth government (which owns Deal Island) to extend permanent protection to the flora and fauna of this splendid island.[1]

Across the strong tidal waters of Murray Pass lie the Tasmanian islands of Erith and Dover, considerably smaller than Deal Island, but each about two miles across at their widest extremes. Erith Island is held under a grazing lease. Dover Island holds special interest as the last island of any size remaining in Bass Strait which remains untouched by the hand of man. The Australian Conservation Foundation is also seeking its protection.

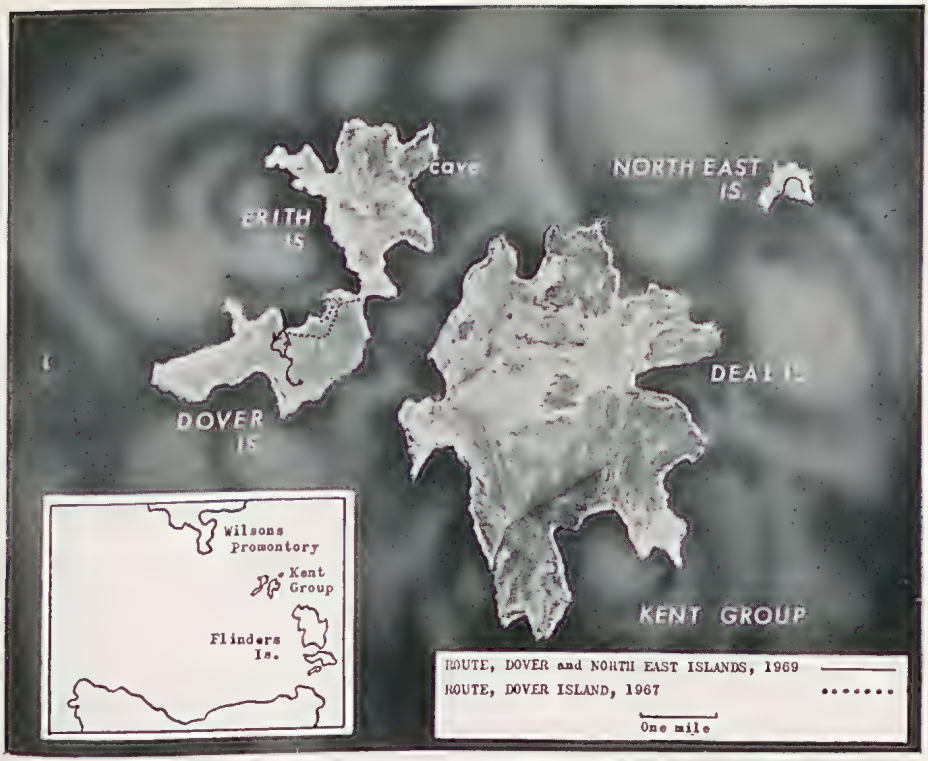
At a further distance from the Kent Group lie two seldom-visited and smaller islands, North East Island and South West Island.

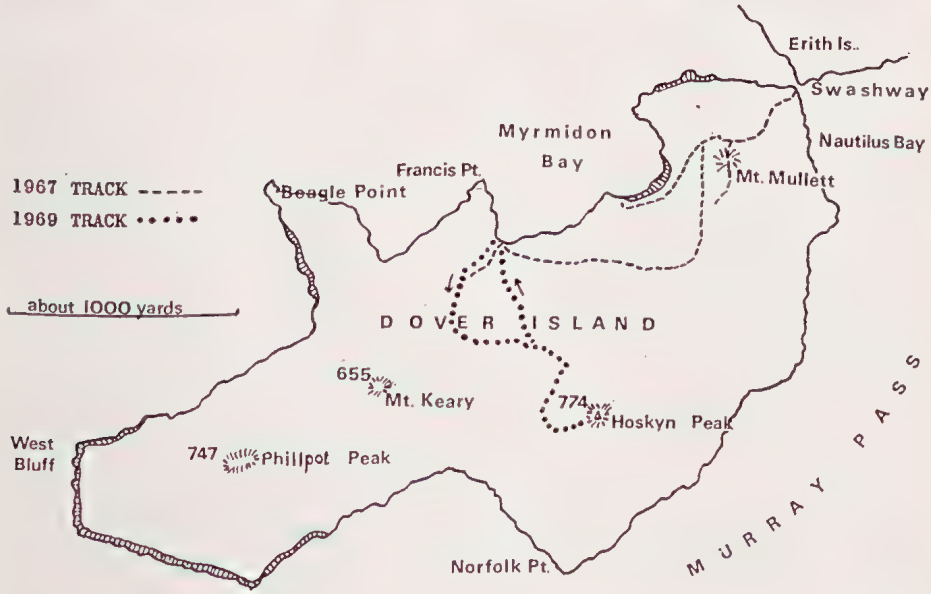
The authors of this article belong to a group which has been regularly visiting the Kent Group since 1962. During December 1968 and January 1969 five weeks were spent there, with headquarters on Erith Island, and investigations commenced earlier were continued. An account of these earlier investigations, together with some background historical material on the Kent Group, will be found in the *Victorian Naturalist* **84**, (8) for August 1967.[2] The first of the authors of this article is a biochemist, the second a historian, so neither lays claim to any professional knowledge in the field of natural history.†

We may, however, draw attention to the fact that scientists are now placing considerable emphasis on the existence of the Bass Strait islands and on the importance of the planned approach to all that happens in these waters: fishing, extractive industries, farming on the one hand, the conservation of the flora and fauna on the other. "Bass Strait is the world's largest area of shallow water so close to a major metropolis that is so little studied and so poorly understood," said J. W. Warren (Professor of Zoology, Monash University) in the recent series of twelve talks on Bass Strait broadcast by the Australian Broadcasting Commission.[3] Mentioning the islands of Bass Strait in the same breath as Darwin's Galapagos Islands, Professor Warren remarked that in Bass Strait biologists have "a marvellous opportunity to study the effects of isolation and restricted

* Both of the University of Melbourne.

† Our group is deeply indebted to Mr. Brian Stackhouse, of Flinders Island; to Mr. Frank Goold, of Port Albert; to Mr. and Mrs. Bob McNeill, of Deal Island; to Mr. and Mrs. Ron Millington, then of Deal Island, and to Mr. and Mrs. Jack Lierich of Port Welshpool. Comalco Industries Pty. Ltd., through the good offices of Mr. Dean Bunney, kindly supplied our party with a twelve-foot aluminium dinghy which proved seaworthy, robust and easily portable, and without which our explorations would have been rendered impossible or vastly more difficult. Captain H. M. Head, Regional Director (Victoria) of the Department of Shipping and Transport, as on previous occasions kindly extended to us the important privilege of emergency wireless communication via the Bass Strait lighthouse network.


cave
NORTH EAST IS.
ERITH IS
DEAL IS.
DOVER IS
KENT GROUP
Wilsons Promontory
Kent Group
Flinders Is.
ROUTE, DOVER and NORTH EAST ISLANDS, 1969
ROUTE, DOVER ISLAND, 1967
One mile


Erith Is.
Swashway
Nautilus Bay
Myrmidon Bay
Francis Pt.
Mt. Mullett
1967 TRACK
1969 TRACK
Beagle Point
about 1000 yards
DOVER ISLAND
655
Mt. Keary
774
Hoskyn Peak
West Bluff
747
Phillpot Peak
MURRAY PASS
Norfolk Pt.

interbreeding between populations" which "may be unequalled anywhere else in the world". Dr. Jeanette Hope, speaking in the same series, mentioned that for a country of its size Australia has very few offshore islands, and that of these "the islands of Bass Strait are amongst the most important, both historically and biologically".

North East Island

North East Island lies rather more than a mile off Deal Island, but the distance is deceptive. Although the ornithologist A. J. Campbell was pulled over to North East Island in 1890 in a whale-boat skippered by the veteran lightkeeper Captain Charles Brown, it would not be a trip to be essayed lightly in an oared boat today. Weather in the middle of Bass Strait is notoriously variable, and our own visit, which was made in Mr. Frank Goold's 48-foot fishing boat *Marjorie Phyllis* (locally called the "ketch"), started in calm but misty conditions, had pleasant sunshine during the couple of hours we were on the island, and returned to the main Group in the teeth of a strong and unpleasant westerly.

Campbell, a member of the 1890 Field Naturalists' Club of Victoria expedition to the Kent Group,[4] called North East Island "a huge, coarse, granite rock, with beetling walls all round".[5] The island is rather under half a mile long, with mounts at each end (the higher 340 feet) connected by a lower saddle. While the ketch hove to some hundreds of yards offshore, members of the party were ferried ashore in our dinghy (ably handled in a rather difficult swell by Mr. Robert Newton), to land at the apex of the embayment to the south of the island.

The first scramble is up a steep gully to the saddle, and it was not long before we gained our first and dominant impression of the island — that the whole surface abounds with life. "Surface" is perhaps misleading, for much of the life is beneath the surface, and walking everywhere is difficult because of the ubiquitousness of the mutton-bird and penguin burrows. One member of the party was considerably disconcerted at finding his big toe in a mutton-bird's beak. Fortunately the Bass Strait folk-lore which prophesied snakes proved unfounded (the only snakes observed in recent years in the Kent Group have been the White-lipped, *Drysdalia coronoides*, which is innocuous to humans, and none of which was seen on North East Island).

Once on the saddle the choice is between the two "peaks" of the island. That on the west is a formidable knob the granite walls of which discouraged all but one foolhardy member of the party. The climb up the eastern, and slightly higher peak is a simple one. The soil is sandy with granite outcrops heavily weathered and decomposing, a feature of the rock being the large crystals of quartz and mica visible in some of the outcrops.

The vegetation pattern of the island is simple. Three species, well mingled, dominate the cover: the Blue Tussock-grass (*Poa poiformis*), the succulent Bulbine lily (*Bulbine bulbosa*) and the distinctive purple-stalked composite Fennel groundsel (*Senecio capillifolius*). The Tussock-grass, interspersed with some Fennel, has captured the upper levels of the island. None of the vegetation grows higher than about three feet. Apart from the above three species, the only other vascular plants collected were a pink and a white variety of the Rounded Noon-flower or Mesembryanthemum (*Disphyma australe*), another small succulent, the Austral Stonecrop (*Crassula sieberiana*), and the Sea celery (*Apium prostratum*), abundant on Erith Island but here found only

in isolated patches near the shoreline. A moss, *Bryum campylothecium*, was also collected, and turns out to be a new record for the Kent Group.

As already mentioned, North East Island is an extensive mutton-bird rookery, and perhaps the only such rookery in the Group. There are now no rookeries on Deal, Dover or Erith, though on Erith at least there is plentiful evidence of earlier mutton-bird occupation. (The nesting of mutton-birds on South West Island has yet to be established.) The mutton-birds nest up to the crest of the island, but the penguin burrows appear to extend only to about two hundred feet. Penguin chicks were seen and handled.

A number of gannets were seen, fourteen or more at one stage, and as they were circling the island, highly disturbed, there is some presumption of nesting.

The most interesting single zoological observation on North East Island was, however, probably that of Dr. John Newton, who clearly and for some time sighted a small mouse-like creature. This was almost certainly a marsupial mouse, either the Swamp Phascogale (*Antechinus. minimis*) or the White-footed Dunnart (*Sminthopsis leucopus*). Mrs. Geoffrey Hope has kindly suggested that, while the latter is perhaps more likely (and is found in the Furneaux Group), *Antechinus*, which is a larger animal, is more widely recorded. Some bones have been found on Deal Island which belong to one or other of these species, but no further identification has been made. Few records for the Bass Strait islands of either species have been established.

Ants and spiders were also noted on North East Island, and the plentiful faeces, both weathered and fresh, of the Cape Barren Goose. No actual Geese were seen, however, though local reports within the last ten years tell of Geese breeding there, and of fishermen running down the immature birds for use as crayfish bait. A pair of Geese landed on Deal Island some two or three years ago, and excellent photographs were taken by Mr. Kevin Underwood, a lightkeeper. More recently a pair were shot and killed by a Port Welshpool fisherman at Garden Cove, Deal Island. All in all, from these and other observations and reports (notably, of course, those of Dr. Douglas Dorward of Monash University and of Dr. Eric Guiler of the University of Tasmania[6]) it would appear that the Geese, so very much an integral part of the landscape and *mythos* of Bass Strait, are in the process of new colonization or recolonization. This is welcome news, but while many of the Bass Strait fishermen are intelligent and thoughtful men, and conservationists, as fishermen ought to be, some remain ignorant, selfish and proud of the ascendancy they can win over nature by means of a gun. Cape Barren Geese are "sitting shots" for the armed fool, both literally and metaphorically. And not only Geese: we observed young fishermen, at anchor in the Kent Group, happily whiling away some boring hours by potshotting at seagulls. We hoped that we on shore were not in the line of fire. There is certainly a case for the Head Keeper of the lighthouse station on Deal Island being made a warden of some kind by the Tasmanian Animals and Birds Protection Board.

So far as we know, ours was the first recorded landing on North East Island since those of Colin Garreau in 1958[7] and A. H. E. Mattingley in 1938.[8]

Dover Island

A central feature of this visit to the Kent Group was to be an attempt to reach the summit of Dover Island, Hoskyn Peak, a 774 feet eminence

midway along the island's spine. Two factors constrained the intention, physical fitness and the weather. Those of us who were going to attempt the climb had to have time enough beforehand to gradually work up the degree of physical fitness that previous expeditions indicated would be essential. Long hours spent sitting at a desk (or at a dinner table!) do not build the sort of back and stomach muscles needed for active camp work and exploring on uninhabited islands. Once a degree of fitness had been achieved, it might still prove impossible to set off immediately. Erith Island, on which we were based, is attached to Dover Island by a rock-strewn "swashway" and it might be thought that an overland route from this connection to Mount Mullett and thence to the peak would be the most practicable. But observations made in 1967 and 1968 had indicated that any such attempt was beyond our resources.[2] It was clearly desirable that we approach from the west, with the lay of the vegetation rather than against it; and this meant going by sea to Myrmidon Bay on the north of Dover, where the island's forbidding cliffs give place to a rocky strand covered with large granite boulders. At this time, we knew of no other place where a landing might be effected with any degree of safety or of accessibility to the hinterland. We therefore needed calm weather with neither wind nor swell running from the west—a difficult requirement in the roaring forties.

Eventually the disposition to go, the right weather and a feeling of physical preparedness came at once, and on a beautiful, calm day (21 January) with only a slight breeze and the gentlest of south-westerly swells, we set out by dinghy from the West Cove of Erith Island, a party of three men (the authors and Dr. John Newton) and two teen-agers (those who explored the Cave of Erith—see below). Arriving at the swashway between Erith and Dover with the tide well out, we had just breath enough left after portaging the dinghy and outboard across one hundred yards of tumbled boulders and sharp granite sand to thank the man that invented aluminium boats. We then motored along the north of Dover a little over a mile, and high into the cod of Myrmidon Bay, where we landed as we had in 1967 amongst the granite boulders.

By 11 a.m. we were climbing easily on one side of a dry water-course and within fifteen minutes had reached an elevation of 350-400 feet. Here we found ourselves in an extraordinary climax forest of Coast Tea-Tree (*Leptospermum laevigatum*) dominant to about twenty feet, interspersed with sub-dominant Swamp Paper-bark (*Melaleuca ericifolia*) and Common Fringe-Myrtle (*Calytrix tetragona*) growing to about ten feet. Where, for one reason or another, there was a little more light on the forest floor, occasional bushes from four to six feet of the Crimson-berry (*Cyathodes juniperina*) of the Large-leaf Bush-pea (*Pultenaea daphnoides*) and of the Variable Sallow Wattle (*Acacia mucronata*) were found. Among the very few readily noticeable plants on the forest floor were found the Sea Box (*Alyxia buxifolia*) and the Red Correa (*C. reflexa* var. *nummulariifolia*) all of them less than a foot high. The presence of so many species makes this forest sound a lively place, but this was not so. We shall long remember those moments spent, often on all fours, forcing our way through a tangle of dead wood, rotting or tinder dry, where death seemed more in evidence than life, with the loose chocolate-coloured, friable soil showing between weathered, crumbling granite rocks, with lichens, moss and

decay everywhere. Much of Dover Island is one big wood heap, and it is a minor miracle that it has survived as such into this savage and destructive age. We are convinced that the Tasmanian Government ought to act quickly to declare this remarkable island not only a national park but a wilderness area, under the supervision of a sensitive and informed ranger. One careless act of a fisherman or a yachtsman, or a stray ember from a fire elsewhere, could destroy this unique ecological remnant. Equally it is a minor miracle that no lightning strike has set it ablaze, and we are also convinced that a properly staffed biological expedition should make an immediate and intensive study of Dover in case a calamity does eventuate.

No description of this forest would be complete without mention of the little Hop Goodenia (*G. ovata*) with its quiet apple-green leaves and yellow flowers contrasting oddly with the decay all around it. Indeed, so widespread is this plant in these islands, that any future Republic of the Kent Group would most likely adopt its little flower as the national emblem!

Striking up towards the main ridge which connects Hoskyn Peak and the centre, though lesser, peak of Mount Keary, we found occasional rocky outcrops which allowed more light to penetrate into the forest so that the whole aspect of it gradually changed, new species appearing and the bare, dry timber of the tea-tree yielding some place to leafier species. Just below the main ridge we saw our first eucalypts of this trip (probably the Manna Gum, *E. viminalis*) with green leaves pleasantly placed low down where we could see them and not in an umbrella above us. This gum was growing to about twelve feet here, as high as we saw them anywhere, but as yet it was not plentiful. We gain the impression from their distribution here and on Deal Island that gums don't like to be too near to places where salt-spray can reach, but we are not botanists and this must remain an impression. Typically, the granite outcrops just below the main ridge on this north to north-easterly aspect were surrounded by a mixture of trees and bushes about ten feet high, with perhaps the most common being the White Kunzea (*K. ambigua*) interspersed with isolated casuarinas, eucalypts and the Coast Tea-tree. Looking up the slope, we noticed that the general height of the vegetation was diminishing conspicuously to about six feet and we began to think that our battle with it might be over before it had fairly begun, and that we had exaggerated the likely difficulties. We were soon to know otherwise.

It was worthy of record at this stage that, although there were plenty of crickets, flies, ants and lizards around us, we had seen very little evidence so far—in the way of faeces—of any large animals, and, most strikingly, we had seen only one bird since landing. This paucity of bird life had been noted previously,[2] and is in contrast to the abundant and varied land- and sea-bird life of Erith Island.

Creeping through rapidly condensing scrub to the main ridge, we saw many beautiful pink orchid-lilies, properly Grass Triggerplants (*Stylidium graminifolium*) and collected a specimen of the Love Creeper vinelet (*Comesperma volubile*). Suddenly we realized that the main ridge had been reached. But no open view awaited us, and the hoped-for easy passage on the weather side failed to eventuate. The weather side was clearly impassable, with a repetition of the tangled dead wood which we had seen further down. We realize now that at this particular spot the southerly slope is protected from the worst of the

south-westerly weather by the bulk of Phillpot Peak and Mount Keary and has managed to grow a thick climax cover. We were driven back to the north slopes and had a most difficult half-hour battling our way for about two hundred yards through dense, head-high scrub until we could cross the dry water-course and so come out on to the more exposed south-west slopes of the main peak. Looking back from a point about one hundred feet above the ridge and the same distance below the series of summits which constitute Hoskyn Peak, we were greeted with a good view of the Hogan islands and of Wilson's Promontory.

We were standing on a fairly steep slope, broken up by large areas of exfoliating granite, the vegetation either growing to a height of 1-3 feet in pockets between the rocks (e.g. the Oyster Bay Pine, *Callitris rhomboidea*) or a little higher (stunted casuarinas and eucalypts) or trailing across the rocks in an extraordinary fashion, blown in a north-easterly direction by the south-west winds (the Manuka, *Leptospermum scoparium*). Here and there were tussocks of *Poa poiformis*, the Blue Tussock-grass so common on North East Island. Other plants collected at this spot were the Coast Tea-tree and the red Common Heath (*Epacris impressa*), occasional specimens of which had been seen from about three hundred feet up.

At 1 p.m. we reached a subsidiary peak on the north of the summit area and, for the first time, obtained a clear view of the main peak, some five hundred yards away and less than one hundred feet above us. We had been convinced that we were the first to come this way, but suddenly we noticed a large cairn on the main peak. We were disappointed, and someone had the bad taste to mutter something about Amundsen's black tent and Captain Scott. However the sight of this cairn strengthened our desire to reach it. As it happened, this last small stretch took nearly an hour and a half to negotiate.

First we set out in a south-easterly direction around the contour, but the presence of a ravine filled with tangled scrub caused us to alter direction to the east in an attempt to come on the peak from the direction of Mount Mullett — the very course which we had rejected right at the outset! As soon as we were a few feet below the exposed south-westerly ridge connecting the two summits, our troubles commenced. The scrub became indescribably dense and tangled. For the first time it was necessary to use a

Scrub-bashing at its worst! The climb up Dover Island involved several hours negotiation of tangled vegetation like this, taken at about 400 feet.

Photo: M. A. Marginson

Cairn on Hoskyn Peak, the 774′ summit of Dover Island. This sustantial piece of work, standing five feet high, was almost certainly built by the bluejackets of H. M. S. *Myrmidon*, a Royal Navy vessel which surveyed the Kent Group under the command of Commander R. F. Hoskyn R. N. in 1886. So far as is known this cairn was not visited between that date and January 1969.

photo: Jane Mullett

compass, as we had lost sight not only of each other but of the summit as well. Few botanical observations were made of a specific nature, but there was a general feeling that the plants were winning. What we mostly remember is that everything was closer and more tangled than we had seen before, but that it was not the strange, dead wooden world of the lower slopes. Our only two specific botanical memories of this area concern the ground—not surprising since at times our noses were very close to it. The orchid-lily was flowering in large patches and in two places there were areas, about ten feet in diameter, which were devoid of all vegetation except for scattered reeds. (These were also noticed on Dover Island by the 1967 party.) We wondered whether these were dried out marshes, but there seemed no indication of mud cracks; they remain a mystery.

After about forty-five minutes of this fruitless bush-whacking we began to lose heart and, much to the chagrin of the younger members, a survey of the almost impenetrable wilderness between us and the summit from a convenient gum tree caused us to turn back. However our teenagers had extracted a promise that on the way back to the lesser peak, where we had left our packs, we would again try to bear over to the weather side. The wisdom of this course became apparent quite shortly, since the wind seems to prevent anything much from peeping over the inter-summit ridge. The cover dwindled rapidly, and about 2.30 p.m. we reached the cairn on the main peak, some three and a half hours and 770 feet above the boulder-strewn strand of Myrmidon Bay.

The cairn proved to be a massive thing indeed, large granite rocks being convened into a roughly cylindrical shape, five feet high and comewhat greater in diameter. In the centre there was a hole which contained nothing but a piece of much weathered stick. A record of our arrival was left protected from the weather in the cairn, and we stretched out on it to get some rest. On looking around, we became more sure that this cairn was not the product of some casual exploration (if such a thing were possible) but that of a well-disciplined party, and we allowed our thoughts to conjure up a vision of a party of bluejackets from the survey vessel H.M.S. Myrmidon in 1886, toiling (in orderly fashion) up the steep broken slope from the south bay of Dover to Hoskyn Peak. (Commander Hoskyn to the most junior officer, Sub-Lt. Smith: "Mr. Smith, put a cairn up there on the top by 8 bells, if you please!") For we could now see what we had failed to see before—that below us on the south coast of Dover Island there was a little rocky shore like that of Myrmidon Bay, where a landing

in a small boat would be feasible. Furthermore the slope, though broken and steep, seemed to offer nothing more difficult than a very rough scramble, being on the weather side and affording (except in isolated ravines) little opportunity for any considerable growth of vegetation. We consoled ourselves with the thought that, if ours were not the first ascent of Hoskyn Peak, then it was almost certainly the second, the first in over eighty years, and the first concerned with the scientific exploration of the island.

The view from the peak was altogether worth every effort which had been made to get there. A 360° panorama had been opened up, except where the peaks of nearby Deal Island slightly occluded the view. We could see in a magnificent sweep from the Hogans and Wilson's Promontory in the north-west and even to the long north coast of Tasmania in the south-west: sheer across Bass Strait. Looking over Deal we were astonished to see the roads of Flinders Island some forty miles away, looking so close that we were sure that we could see traffic on them! And everywhere were the lesser islands—South West Island standing out in a silver sea, the Curtis Group, Pyramid Rock and the other rocks and islets that make Bass Strait at once the fascinating and dangerous place that it is.

The flora at the summit was very much like that of the south-westerly slopes described above, granite outcrops being interspersed with the Oyster Bay Pine, Manna Gum (?) to ten feet, the Large-leaf Bush-pea and the Coast Tea-tree, with here and there an isolated, stunted casuarina. The height and composition of this cover seemed to depend very much on quite marginal differences in exposure to the south-westerlies, complete exposure stunting all these plants and driving them into crevices. Most striking was again the Manuka, with its wind-blown growths straggling long out over the exfoliated granite, so that flattened fans of branches may stretch for up to twenty feet before the small foliage area is reached. Other verified specimens from this area, and between the summits, included the Common Fringe-Myrtle, the Tree Broom-heath (*Monotoca elliptica*), the Tasmanian She-oak (*Casuarina monilifera*), an isolated specimen of the Silver Banksia (*B. marginata*) growing some way down the south-west slope, the Sand-hill Sword-sedge (*Lepidosperma concavum*) and the Slender Rice-flower (*Pimelea linifolia*). Lichens, mosses and fungi collected on Dover are listed separately at the end of this article, but no account of the flora would be acceptable to those who were on this journey unless it mentioned the lichen *Cladonia sylvatica* with its friable balls of yellow-green dotted prolifically wherever the ground was level and a little clear, and of the equally friable mounds of the Coral Lichen (*Cladia retipora*), great chunks of which we broke off and carried around with us in a rather bemused fashion. In the summit area we also collected faeces which were probably those of the Brush-tailed Possum.

After staying nearly half an hour, we returned to the subsidiary peak in half the time of the outward journey. With energies somewhat tried we dawdled another half-hour here, savouring the impressive views to the north and to the south-west and basking on the hot rocks like lizards.

At about 4 p.m. we set out for Myrmidon Bay and, not wanting to repeat the struggle along the main ridge, it was decided to make a direct descent over the granite outcrops on the northern slopes of Hoskyn Peak. This proved to be a sensible decision, but it involved a great deal of crawling

Near the entrance to the Cave of Erith. The large heap of red earth is being faced by the figure in the foreground.

Photo: Robert Newton

on all fours over the outcrops and through dead, dry undercrofts dusty with pollen and crumbled leaves. Eventually we reached one of the dry water-courses and descended more or less directly down it. Here we met with an almost tropical tangle of vines, green plants and spider-webs—in fact Dover, like Erith, abounds with spiders. It was exhausting work, especially for the leader who elected to force his way through this difficult growth; the rest of us were pleased to benefit from his exertions. Finally, we burst out of this jungle, across a bank of succulents and on to the granite boulders of Myrmidon Bay at about 5 p.m. The whole ascent and descent had taken six hours.

Since there was still plenty of daylight left, we motored around Francis Point and then Beagle Point into the embayment on the far western end of the island. Momentarily, having the crossing of the swashway in mind, we considered rounding this end of the island, and returning home southabout through Murray Pass. But wisdom prevailed, the thought of overfalls at the entrance to the Pass in a heavily laden, twelve foot dinghy being the deciding factor. This little excursion showed that another landing point probably exists on the north-eastern side of Beagle Point, rather similar to that which we had used at Myrmidon Bay. Apart from the swashway itself, there would appear to be no other landing places than the three we have mentioned, the rest of the coastline being composed of great granite outcrops over which the waves swill incessantly and of beetling cliffs up to six or seven hundred feet high.

Back at the swashway, we again carried our boat and motor across, the tides obstinately refusing to help us. It was then that we made our last scientific observation of the day—it is a curious fact that the specific gravity of aluminium quadruples if it is allowed to stand for six hours in the sun on a granite shore. Finally we motored into our home bay on Erith at about 7 p.m., having been away only nine and a half hours, but having been through one of the most memorable days that any of us will ever experience.

The Cave of Erith

This remarkable natural phenomenon was first entered, so far as is known, in January 1969 by Jane Mullett (16) and David Murray-Smith (15) in an enterprising exploratory walk.

The cave is situated in the north-east embayment of Erith Island, called by us Jane's Cove, and is visible from the sea as a cleft in the granite cliffs below a 466 feet high peak on the north coast of the island. From the sea the cleft appears unapproachable, but investigation shows that a practicable route lies along the rocks from the deepest point of Jane's Cove, provided that the approach is made at

low tide and preferably in westerly weather. After about a half-mile of rock scrambling a section of tumbled rocks is reached which is clearly the debris of massive rock falls from the cliffs above. Indeed many great rocks, weighing hundreds or thousands of tons, are still poised menacingly on the heights above.

The entrance to the cave lies some seventy-five feet above high-water level, and is reached by a strenuous scramble up a grass slope and then through tangled bushes and loose rocks at a forbiddingly steep angle.

The cleft appears imposing enough from the sea, but the surprise on reaching its lip is to discover its depth and extent. The cave dips down below the entrance level and then rises again, extending into the cliff face for a distance of nearly 200 feet before becoming a fissure. The proportions of the cave are regular, the height averaging about thirty-five feet.

A musty smell is immediately noticeable, but the outstanding feature is the black, powdery soil covering the floor of the cave and deadening footfalls. The black soil is dramatically interrupted by one large mound of red-powdery material, about eight feet across and three feet high at the peak, with several smaller mounds of the same material. The black base material is fifty per cent organic, and could be partly bat guano; the red material also has some organic content, we are informed by Professor G. W. Leeper, but is more like an ordinary clay-loam soil. While this would be explicable if the cave were of limestone, it is, however, a granite cave and hence the red deposits remain puzzling and samples await further analysis.

Small drip pools are evident in the cave, lined with a delicate green moss-grass, the Nodding Club-rush (*Scirpus cernuus*). Specimens of the Slender Rice-flower (*Pimelea linifolia*) were collected just outside the entrance to the cave, and plant leaves were collected from near a water drip on the wall, some forty feet in from the entrance, but were not identifiable.

Some short stalactites up to a foot in length, covered with a fine glaze, were observed. We found what we assumed to be penguin tracks, and the skull of a crow well within the cave, together with a skull and tracks of the Brush-tailed Possum, and beetle tracks were observed in the fine dust on the floor of the cave. There were no traces of human occupation, and no Aboriginal artifacts have been found, to the best of our knowledge, anywhere in the Kent Group.

Of Domesticity and Noon-flowers

Some random but perhaps interesting observations from Erith Island are worth recording briefly. Three members of the party, living on a tent-site disrespectfully known as "Chinatown", shared many of their waking hours and some of their sleeping hours with a penguin family, over a period of five weeks. This permitted a long and very close period of observation of the rearing of a pair of young penguins, until they were forced to descend to the sea for their first swim.

Despite the depredations of fishermen seeking crayfish bait from time to time, Erith Island, with the other islands of the Group, is a haven for the Fairy Penguin. They enter tents, dispute right of way on paths, fall into rubbish pits, and in general enter fully into the spirit of camp life. As is well known, their holes or "nests" may be barely above high-water mark or hundreds of yards inland and hundreds of feet above the sea. In this case Chinatown occupies a flat platform, perhaps fifteen feet by thirty some twenty feet above high water mark; actually, the site on which, some ten years ago, Mr. Jack

Part of Valley of the Noon-flowers, Erith Island. This spectacular valley at the western end of Erith Island has a floor many acres in extent covered solely with Mesembryantemum spp.

photo: S. Murray-Smith

Lierich built single-handed and launched a thirty-eight foot fishing boat, still sailing Bass Strait waters as the *Mirrabooka.* (Mr. and Mrs. Lierich were in residence on Erith Island for four years.)

The pair of chicks were living in a burrow directly behind a primitive driftwood structure which the residents of Chinatown described as their kitchen. They looked, with great owl-like eyes and ruffle of brown and cream juvenile plumage, to be twice as big as the adult with them. All night long the adult(s?) brought food to them and the night echoed to the whistling of the young and the squawks of the adults. As the weeks went by and the moult into adult plumage commenced, the young became increasingly enterprising, and indeed bullying. They would emerge from the burrow and lie in wait for the cropful adult at the top of the steep bank leading up to the burrow. Then amidst frantic grunts, whistles, squawks and screeches the two young would fight for the right to thrust their bills into the parent's gullet in search of fish. It rapidly became clear as the moult progressed that one of the pair was emerging as the dominant and we watched this factor develop as the adult plumage appeared.

This plumage appeared first on the leading edges of the flippers, then on the tail, next on the back and then on the belly, until near the end the appearance of this tatterdemalion pair was utterly grotesque, the whole of the head being covered in juvenile plumage while the body and feet and leading edge of flippers were adult. They looked as though they were wearing great helmets.

Finally, there was just a trace of the juvenile plumage left on the top of the head and on the back of the flippers. Within a few more days even this disappeared, and it was clear that the night for swimming had arrived. The whole process had taken nearly five weeks. The night before we left, they all disappeared to the sea—or so we thought. But on packing up, under one of the wooden cases we found, quivering, the more timid one of the pair, and careful observation showed that it still had just a trace of juvenile plumage. It was clear that it had been deserted, but whether it was able to take the plunge without encouragement we shall never know. It was like seeing a close acquaintance in the grip of some nameless and irresolvable dilemma.

Our second observation relates to an afternoon walk made by a number of members of the party to the far western end of Erith Island, previously unvisited except in the previous year by two teenage members of the group. The walk across the Vale of Erith to Wallibi Cove is straightforward, as the island is grazed by cattle and their paths make easy walking. From Wallibi Cove a steep hill is climbed, only to descend again the other side to a low-

lying neck of land which connects the rugged outpost of West Point to the rest of Erith Island. At this point we were astonished and delighted to see that almost the whole of this connecting piece of land, which must measure some twenty acres in extent, has an unbroken cover of Mesembryanthemum. Several different species are mingled together(probably a factor here would be their relative tolerance of salt spray, certain varieties predominating near the sea and others further away from it), and the general effect is that of a remarkable green carpet. In bloom the sight must be spectacular, but even as we saw it, with a background of the big seas rolling in from the west and crashing in spray on the granite shoreline and the offshore rocks, it remains one of the memorable experiences of this island. We have named this the Valley of the Noon-flowers.*

And it was in this quarter of Erith Island, between Wallibi Cove and West Point, that we observed a pair of Cape Barren Geese which appear to have taken this as their territory. So far as we know this is the first record of Cape Barren Geese on Erith Island, and may be significant in the light of the tentative evidence available, and mentioned earlier, that the geese are colonizing or recolonizing some Bass Strait islands to which they have been strangers. We were particularly pleased to see these great birds, not only because of their rarity, but because they belong to these waters and without their presence the islands seem to that degree incomplete.

The Weather at Erith Island

We have often been interested in the weather patterns of Erith Island. To those accustomed to summers on the nearby Victorian mainland, for instance, the differences are striking. The most noticeable general difference to the layman is that on Erith Island (and the same no doubt would apply to other small and isolated islands, both in Bass Strait and elsewhere in comparable latitudes) the daily temperature range is small and the humidity usually rather high. It takes some time to dry clothes. and a wet sleeping bag is a disaster! On the other hand it is unusual to feel either particularly hot or particularly cold. Another feature of the weather we have noticed is that in the period we were there, late December and January, halcyon periods of beautiful sunny days alternate, perhaps on a three or four day cycle, with blustery and sometimes fierce windy weather—although (and somewhat to our concern, for we rely on a small tank for water supplies) there is surprisingly little rain. We have also noticed that the daily maximum temperatures occur surprisingly late in the afternoon. We hold twenty-eight days' records (see below). On twenty-three of these days a maximum "peak" is discernible. On eight days it occurred between two and four p.m., on nine days between four and six, and on four days between six and eight. Even allowing for our Tasmania Summer Time (T.S.T.), one hour ahead of Eastern Standard Time, it would appear that the maximum is reached on the average some two hours later than on the mainland, and our physicist friends find it hard to account for the phenomenon.

The westerlies provide a dramatic spectacle, for blowing over the island and down the Vale of Erith they sweep down and back over the cove on which we camp, giving rise to remarkable whirlwinds or "williwaws" in the bay. It is quite a common sight to see six or eight fishing boats and yachts each lying on their chains at a different

* Mr. Geoffrey Hope has informed us that a somewhat similar phenomenon is to be found in the Hogan Group.

angle, and on days like these the yachtsmen among us claim it would be possible to sail a circular course in our bay on the one tack.

Living under canvas, as most of us do, we naturally have a pronounced interest in the weather. Three or four days of high wind can make anyone grumpy and out of sorts. Thus we were pleased to accede to the suggestion of Dr. F. A. Berson, of the CSIRO Division of Meteorological Physics (Aspendale, Victoria), that we take with us a self-recording thermo-hygrograph and miniature Stevenson's screen, thus enabling us to make a twenty-four hour record each day of temperature and relative humidity. Needless to say this bi-functional device was soon christened by us the "hermaphrodite". We are indebted to Dr. Berson for the following analysis of our meteorological records.

The midsummer weather in Bass Strait, like that of south-eastern Australia generally, is controlled by the migratory barometric "highs" in middle latitudes. Unlike most places at the mainland's southern coast, Erith Island, owing to its maritime environment, is however spared the hot northerly winds which at times even reach down to Tasmania.

It may be of some interest to compare the Erith temperature and humidity with those at two selected stations, Aspendale at the eastern shore of Port Phillip Bay, about 130 nautical miles to the north-west, and Pat's River on the west of Flinders Island, about 45 miles to the south-east.

For the period 30 December 1968 to 26 January 1969 the average recorded maximum temperature at Erith Island was 71·7°F as against 79·5° at Aspendale and 73·2° at Pat's River. The minimum temperatures were 59·1°, 57·2° and 55·1°, respectively. The average *daily temperature range* at Erith Island was thus 12·6°, compared with 22·3° at Aspendale and 18·1° at Pat's River, a good indication of the island's pleasantly maritime summer climate. With it goes, of course, some increased *relative humidity*, e.g. in the mentioned period the average relative humidity at 9 a.m. (T.S.T.) was 79 per cent., while at Aspendale (9 a.m. E.S.T.), it was only 49 per cent. and at Pat's River (T.S.T.) 68 per cent. The corresponding average temperatures at 9 a.m. were 63·5°, 68·9° and 67·0°, while the average wet-bulb temperatures were 58·7°, 59·7° and 61·1°.

The highest recorded temperature at Erith Island was 87° on 17 January, when Aspendale had 100°, while at Pat's River it was also 87°. On 8 January, the day of the disastrous Lara fires, Melbourne had 102°, and even at Pat's River the mercury climbed to 97°. Unfortunately, the instrument at Erith Island failed to properly record the temperature during the earlier part of the day, but the maximum temperature did not much exceed 85°. A timely cool change soon after midday reduced the temperature to a pleasant 71° by 3 p.m.*

* We wish to acknowledge the assistance of the CSIRO Division of Meteorological Physics in making available the recording apparatus and the Division's own records, and that of the Bureau of Meteorology in allowing access to the Flinders Island records.

Appendix I

As before, we are most grateful to Mr. J. H. Willis, of the National Herbarium, Melbourne, for the identification of the plants we brought back with us, and for his unfailing encouragement.

We are not listing here all plants collected, but only those which are new records.

New to Kent Group

Sand-hill Sword-sedge (*Lepidosperma concavum*), Dover Island, near summit.

? Manna Gum (*Eucalyptus viminalis*), Dover Island (if correctly determined).

Blown grass (*Agrostis avenacea*), Jane's Cove, Erith Island.

Bryum campylothecium (moss), North East Island.

New to Erith Island

Nodding Club-rush (*Scirpus cernuus*), in Cave of Erith.

Sickle Fern (*Pellaea falcata*), under scrub, near West Cove.

New to Dover Island

Silver Banksia (*Banksia marginata*), near summit.

Tree Broom-heath (*Monotoca elliptica*), near summit.

Tasmanian She-oak (*Casuarina monilifera*), near summit.

Appendix II

This comprises a list of Bryophytes and Fungi collected in 1967 and 1969. The identifications are by Mr. J. H. Willis.

Erith Island

? *Philonotis* sp. (minute) (in cave); *Sematophyllum homomallum; Weissia controversa.*

Dover Island

Campylopus bicolor; *Sematophyllum homomallum* (abundant); *Lophocolea semiteres* (Hepaticae).

North East Island

Bryum campylothecium

Fungi from Dover Island

Phellinus robustus (on ? *Melaleuca ericifolia*); *Trametes cinnabarina.*

Appendix III

These lichens of Dover Island, collected in January 1969, have been identified by Mr. Rex Filson, of the National Herbarium, Melbourne.

Cladia aggregata–C. sullivanii (mixture); *C. retipora*; *Cladonia sylvatica*; *Anaptychia obscurata*; *Parmelia ferox*; *P. perlata*; *P. reticulata*; *Teloschistes spinosus; Usnea* sp. (aff. *U. barbata*); *Ramalina fastigiata.*

References

[1] Australian Conservation Foundation: *Newsletter*, No. 6, January 1969, p. 4. A useful general introduction to the Group is *A Field Guide to the Kent Group Bass Strait*, by J. H. and G. S. Hope, Melbourne, 1968 (processed).

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Hyla nannotis
(Small-eared Tree Frog)

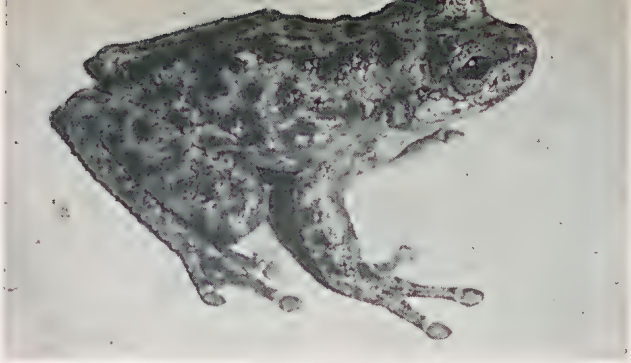


photo: Author

continued from p. 252

close to one of the many little waterfalls, they were hard to record effectively. We caught six or seven more individuals; some males and females in amplexus in the shallow pools full of the red and brown leaves were so similar to them in shape and colour that they gave themselves away only by moving.

The dorsal colour is golden brown, and the leaflike shape is accentuated and outlined by the dark brown sides of head and trunk, the two areas being separated from snout to groin by a narrow, cream-coloured ridge. The back is smooth with two small warts behind the eyes and three dark, warty areas forming a triangle at the posterior end of the body. The legs have dark brown crossbars.

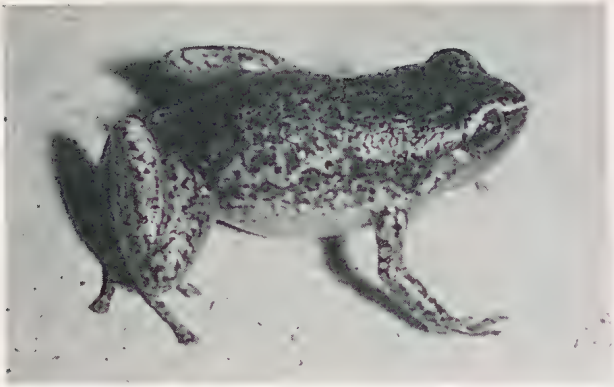
This frog is confined to rain-forest creeks in the mountains of North Queensland.

David and I waded up and downstream and disturbed among the crevices of the black rock some specimens of a rather large, very dark and annoyingly active *Hyla* species, with a short, broad head and prominent eye-bulges. We caught several, and the colour changed later to an all-over pattern of dark spots and patches on an olive green background. These turned out to be *H. nannotis*, the Small-eared Tree Frog—the tympanum or eardrum is either invisible, or very indistinct, as it is, of course, in many other species, but here the specific Latin name records the fact.

We also caught a specimen of *H. eucnemis*, the Green-eyed Tree Frog, previously known as *H. serrata* because of the clearly scalloped outer edges of the feet and forearms. The frog was very dark when caught, but later changed to an attractive patched pattern of light brown and green. In most specimens of this frog, parts of the iris of the eye, and adjoining areas of skin, are a vivid, light green. Specimens may reach 70 mm in length.

Next week-end, Clyde Coleman of the North Queensland Naturalists' Club, organized an excursion to Speewah, in the ranges northwest of Cairns, and I joined the party. We drove in two vans to the old pastoral property of Mrs. Vievers, one of the pioneers of the district. After enjoying her hospitality at the homestead, we set off along the stony creek where the edges of rainforest and sclerophyll forest merged.

At the creek, turned stones revealed a number of small, stocky, extremely active frogs, the most striking feature being the colouring of the smooth, shining ventral surfaces. In some individuals this comprised separate areas of violet, light yellow and green, with some orange or yellow mottling; the ventral surfaces of thighs and legs were orange with violet mottling. The



LEFT: *Sphenophryne pluvialis* from Speewah.

BELOW: *Cophixalus ornatus* (Note the "W" pattern between shoulders, and the oscellate spots towards posterior.)

brightness and extent of the coloured areas varied from frog to frog, some being almost uncoloured. The dorsal surfaces are mottled dark brown. A light line runs from the tip of the snout, curves over the eye and becomes part of the general mottled area behind it. The face is dark brown, the iris mottled red.

The tips of the fingers and toes of these frogs are expanded into pads. However, they are not Hylids, but members of the family Michrohylidae. This family has over 50 species in New Guinea, and six in Australia, all from rain-forest in the eastern part of Cape York Peninsula. The Speewah specimens turned out to be *Sphenophryne pluvialis*. They were all under 30 mm long.

Further down the creek we found members of another species of the same family, an even smaller frog, *Cophixalus ornatus*, between 20 and 25 mm long, with a smooth skin, medium brown dorsal surface and unpigmented or mottled brown ventral surfaces. A dark stripe runs behind the eye for a short distance, then recommences to run along the side. On the back, posteriorly, is a pair of ocellate spots, and anteriorly, a W-shaped pattern on the shoulders. In this species the short first finger lacks the expanded tip.

A metamorphosing individual of one of the *Mixophyes* species was found at the edge of the water, but it was too young to be identified.

We found several more specimens of *H. eucnemis*, the Green-eyed Tree Frog, and these, like the one David and I found, were very dark when located, changing later to a map-like pattern of green and brown, with the iris brilliantly green in parts.

Several light brown medium-sized frogs were found which puzzled me. They had a distinct narrow ridge running along the sides from the snout towards the posterior end, where it broke up into separated raised warts. The limbs were faintly cross-barred. The tips of the fingers and toes appeared to be expanded, but I could not

identify them as *Hyla* species, and they were too large for Microhylidae. Clyde Coleman had previously given me a much larger specimen, and these were presumably half-grown. The Australian Museum later identified these specimens as *Rana daemeli*, the only Australian species of the Ranidae family, which is better represented in New Guinea.

The following list contains the species mentioned in parts 1 and 2 of "Frog-hunting up the East Coast".

New England District

Kyarranus sphagnicola
K. loveridgei
Adelotus brevis
Limnodynastes tasmaniensis
L. peroni
L. dorsalis
L. fletcheri
Mixophyes fasciolatus
Crinia signifera
C. parinsignifera
Uperolia marmorata
Pseudophryne bibroni
P. coriacea
Hyla aurea
H. bicolor
H. peroni
H. verreauxi
H. booroolongensis
H. phyllochroa
H. citropa

Queensland

Hyla bicolor
H. rubella
H. nasuta
H. rothi
H. ? lesueuri
H. nannotis
H. eucnemis
Uperolia marmorata
Limnodynastes peroni
L. dorsalis
L. tasmaniensis
L. ornatus
Mixophyes fasciolatus
Taudactylus acutirostris
Sphenophryne pluvialis
Cophixalus ornatus
Rana daëmeli

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Field Naturalists Club of Victoria

F.N.C.V. General Meeting
11 August, 1969.

The President Mr. E. R. Allan was in the chair and about one hundred members were present. Mr. Allan announced that Mr. Vic. Miller who is 94 years old and our oldest member, had been hit by a car. The good wishes of the members were sent to him for a quick recovery from his accident.

Minutes of the last meeting were taken as read on the motion of Mr. Lewis and Mr. B. Cooper.

Four new members whose names appear in the August "Naturalist" were elected on the motion of Mr. Swaby and Miss J. Woollard. The President announced that Council had appointed Mr. J. Strong to fill the vacancy of Vice-President of the Club after the death of Mr. McKellar.

He also announced that the "Naturalist" will continue in its present form since new arrangements are being made to reduce the *increase* in printing costs by approximately half.

The World Wild Life Foundation Report 1965-7 was available at a cost of $3.00. Members were reminded that this fund needed support.

Conservation Organizations are holding a meeting in the Melbourne Lower Town Hall on Friday, 29 August to discuss alienation of our Crown Lands.

He also reported that the Board of Works is holding an investigation into Landscape Conservation and Preservation. Members who know of special areas to be considered should contact Mr. Harris of the Board of Works.

Dr. M. Beadnell announced that an Astronomical Society Meeting will be held on 24 August. Miss J. Woollard said that a recent "Current Affairs Bulletin" dealt with Conservation. The subject for the evening was "Seals of Western Port" by Mr. R. N. Warneke. He said that Seal Rock fur seal rookery was one of four off the Victorian coast, the most eastern being off Wingan Inlet, another Rookery Island off Wilsons Promontory and the most western being Julia Percy Island. The Western Port Seal Rocks are actually two islands with a low basalt reef and a very limited area for a boat to come in and only if seas are not rough. He showed pictures contrasting the rough and calm conditions and of the masses of seals on the protected areas of basalt. A comfortable self contained dwelling is on the highest point and there are two observation covered centres overlooking the main rookery areas. A flying fox is used to get in safety to Black Rock from the hut. Mr. Warneke has three assistants. Usually at least two at a time are in residence, all the time in the breeding season and one week in four in winter. Breeding Bulls come ashore in mid-October and take up territories about 15 feet in area on the basalt and defend that territory against rivals. At the beginning the confrontation is more ritual—barking at each other from a distance. Later in the season when mating is occurring there is a stronger challenge, chest to chest pushing and barking with heads up. Teeth can inflict bites, the canine teeth being heavily developed. They try to grab flippers with teeth and they bury teeth in the skin of the thick neck and try to turn the 620-700 lbs of rival over. There is rarely a death in a fight. They are heavily coated with blubber for reserve as they don't feed between October and Christmas.

When a loser of a conflict leaves the territory, other territory defenders attack him and give him a bad time. Bachelors congregate in a strip inland behind the breeding strip in which a corridor is left for non breeders to go to water.

Usually in the second week in November the first pup appears. There are always females on the rock. Sea gulls do good work in cleaning up membranes. A week or ten days after the birth of a pup the female is ready to mate and seeks the male, some being very persistent. The female fur seal is smaller than the male being from 170-200 lbs.

At the end of November the rookery shows masses of wriggly black pups congregated close together.

A two year old may still be a suckling though usually this species of fur seal nurses the young for one year. One in last season was almost four years old and still a suckling. Probably the mother lost previous pups or the yearling may have been so persistent and aggressive pestering the mother and the new pup, which may die.

There is a high mortality in the pups; 15% die by the end of the second month. Twins are rare. There is a very strong relationship between the pup and the

female who won't accept another pup. At first she nurses the pup for two days before going to sea for food. The pups mass together and when the female returns to the one thousand or so pups she finds hers by vocal recognition. Mr. Warneke demonstrated on a tape recorder the harsh noise of the female barking and the smaller bleat of the pup who leaps out of the mass and rushes up to her and she sniffs and recognizes her own.

The seals are sensitive to heat over 90°F. The fat insulates against the cold of water but they suffer from heat and dip their flippers in the foetid tide pools to keep cool. They also lift flippers to catch a breeze. They do not pant.

If a bull is not near a pool he must go into the sea and returns late in the afternoon.

The officers cannot handle the females when they are attending the pups. They try to mark as many bulls as possible after drugging them with a gas gun forcing a syringe with the drug into them just behind the thick shoulder. The weight of the animal and the suitable amount of drug are considered. Then they can be weighed correctly and examined extensively. The annual marking of pups is important and every January after breeding has ceased and the bulls gone, three weeks are spent catching any pups they can, taking vital statistics, tagging on the flippers, and branding. The officers examine small groups at a time, cooling them with buckets of water. Each is caught by hand, sex checked, body measurements taken, and branded on shaved skin patch with a cold iron brand at —95° which causes less distress than a hot iron. The cold destroys the cells that make the pigment and when hair grows there is a white patch in the shape of the brand e.g. 'O' meaning January 1969. One picture showed a pup with a collar. Some tag returns have been from above the Darby River at Wilson's Promontory to Cape Otway, from Burnie (Tasmania) and from Victor Harbour (S.A.).

In the first breeding season, of the 4-5000 seals ashore some showed nasty wounds. It is thought that these are from big sharks especially White Pointers which have been caught—nine being taken in the winter. One Shark had a tagged seal inside. These sharks were up to 14½ feet long and weighed 1620 lbs.

Information on the diet of seals can be gained by examining undigested food vomit which includes, Cuttlefish, Squid, Octopus, Crayfish and fish ear bones. In In addition to the clear slides illustrating the talk Mr. Warneke brought a strong skull of a seal bull and the skin of a female fur seal.

The President thanked Mr. Warneke for the interesting talk and members showed their appreciation by acclamation and their keen interest by asking many questions. Answering a question on their span of life Mr. Warneke said that bulls may be 12 or 15 years old before being able to gain breeding territory. Captives are known to live 30 years but the average life would be much less.

The Secretary Mr. D. Lee mentioned several books of interest to Naturalists. These included Densey Clyne's book on Frogs $4.25.

Snowy Mountain Walks $1.50, a book on Australian Desert Life, and others on Bushwalking and Camping.

The Secretary brought to notice a book received "Australian Fly Catchers" by Brigadier Officer $5.00

Mr. D. McInnes appealed for helpers for the Nature show and gave out leaflets and posters advertising it. Barry Cooper sold many "Save the Little Desert" car stickers (2 cents).

Exhibits:

Mr. A. J. Swaby brought two Little Desert plants—

1. Jumping Jack Wattle, *Acacia enterocarpa* from near Kiata. The zig-zag seed pod suggests the common name.
2. Spiny Wattle *Acacia spinescens* which also extends to W.A.; usually there is no sign of a leaf after the seedling stage. This is easy to strike from the seed.

He also brought flame pea, *Chorizema cordatum*; woolly grevillia *G. lanigera* (W.A. Vic. etc.) Pink spider flowers. *G. linearis* in an unusual white form, a tall shrub frequently in bloom. A dying coast Wattle showed the production of numerous buds.

Mr. J. Strong showed 2 molluscs—

1. *Pictonerita ovalanensis*, necklace shell from Mangrove swamps near Cairns — under the microscope these revealed an infinite variety of patterns.
2. Scaly lined limpet *Notoacmea scabrilirata* from Tulum Western Port showing colour and pattern variations.

Mr. D. McInnes showed fossil fresh water ostracods from limestone of a fossil lake from Coimadai where this "water flea" like deposit is 7 inches thick.

Mr. J. Sault brought several lichens and demonstrated the spore forming heads under the microscope.

Marine Biology and Entomology Group

4th August, 1969.

Mr. Condron chaired the meeting which was attended by 14 members.

The secretary read a letter from A. B. V. Channel 2 in answer to a request for a repeat of their program "The World About Us". They regretted that owing to restrictions of copyright, they would be unable to comply with our request.

As this was the last meeting before the Nature Show discussion took place about the Group's exhibit. At the moment there are some lighting difficulties which we hope to resolve before the show commences. Mr. Condron and Miss Forse have offered to check in this respect. Mr. Strong offered to assist Dr. Smith with regard to a display of shells and other marine specimens. Mr. McInnes showed a plan of the show layout and explained where different exhibits are to be placed.

It was announced that there would be no meeting of this Group in September as the night would fall on the first night of the Show. The Secretary also announced that he and Mr. Strong would be away for the October meeting. Mrs. Z. Lee kindly offered to show some of her nature slides on that night.

Dr. Brian Smith advised that the next work-in at the Museum would be held on 16 August at 10.30 a.m. Members were invited to participate.

Mr. R. Condron stated that the Entomological Society was unable as advertised to show films of the fruit fly and sirex wasp at their last meeting. These are now to be shown on Friday 22 August at the Herbarium. Members of the F.N.C.V. would be welcome.

Exhibits—

Miss Jenny Forse showed some larvae of some species of moth; these fed on the leaves of the Blue Gum. Also a nest of sugar ants collected for display at the Nature Show. Miss Forse gave a short and very interesting talk on these.

Sepiidae species *Arctosepia braggi*, (VERCO.), collected at Port Lincoln, South Australia. Dr. Smith explained that although the bones of this species had been found, this was the first time a live specimen had been taken. He went on to say that 37 species of this family had been described from Australian waters, only 10 of which had been described from the entire animal.

Miss White showed two "saw flies", male and female and explained that the female has a saw with which she penetrates the leaf. Although commonly called a saw fly, Miss White said that actually these were members of the Order HYMENOPTERA, and were, therefore, wasps. Also a katydid or long-horned grasshopper, and a specimen of stick insect.

Mr. McInnes showed a marine mussel under a Club Microscope. Examination of the growth on the shell revealed a species of colonial verticella, probably Epistylus, and also what looked like a small species of Hydrozoa.

Mrs. Strong showed the case of a species of case moth *Thyridopterix herrichii*, the ribbed case moth, family Psychidae, taken at Mount Piper near Broadford.

Mr. Ken Strong showed under the Club Leitz Microscope, a slide which he had made of a fairy fly. He described how he had found it in some pond water, and said that it was parasitic on may fly larvae.

Mr. J. Strong showed under a Club microscope, shells of "The Necklace Nerite", family NERITIDAE, species *Pictoneritina ovalanensis*, collected by himself and Mrs. Strong at Yule Point near Cairns, North Queensland in 1962 taken from a mangrove swamp. These were shown to demonstrate the great variety of colour and pattern in this species.

(cont. from page 253)

follows their previous high standard of publication.

The small format of the book poses difficulties for its layout and design. It is composed of alternate pages of printing, and complete pages of colour photographs. This necessitates the captions for the illustrations being printed on the same page as the text. The text is arranged in two columns with the captions sometimes commencing below the first column, therefore requiring the text to be continued on the next page. In some cases, especially where the captions are also continued, this becomes quite confusing to the reader.

The short Introduction briefly relates how some of the plant families were named in honour of early Australian explorer-botanists.

The book includes 32 families of plants, with over 100 species illustrated and many more described. It is arranged according to J. Hutchinson's The Families of Flowering Plants. The authors have tried to present the main groups of plants giving a geographical coverage at the same time showing "the scope and contradictions of Australia's flora". Little known species as well as popular garden varieties are included.

Under each family an idea is given of the distribution in Australia, and mentions other countries where the family occurs. The number of genera and species in a family is noted, plus a description of the plant such as flowers and leaves, with any interesting scientific values or notable features it may have. Interesting facts concerning the history of family names accompanies some sections.

The book's value is increased by the comprehensive glossary of terms used in the text, a good index to both text and photographs with common and botanical names listed, and a bibliography of 19 publications.

In order to illustrate lesser known species, Australian Wildflowers in Colour is useful to the botanist and layman as a supplementary text. It is excellent as an introductory book to keep alive a young person's awakening interest in Australian flora, and it would make an ideal present for overseas visitors and friends.

Sue Filson

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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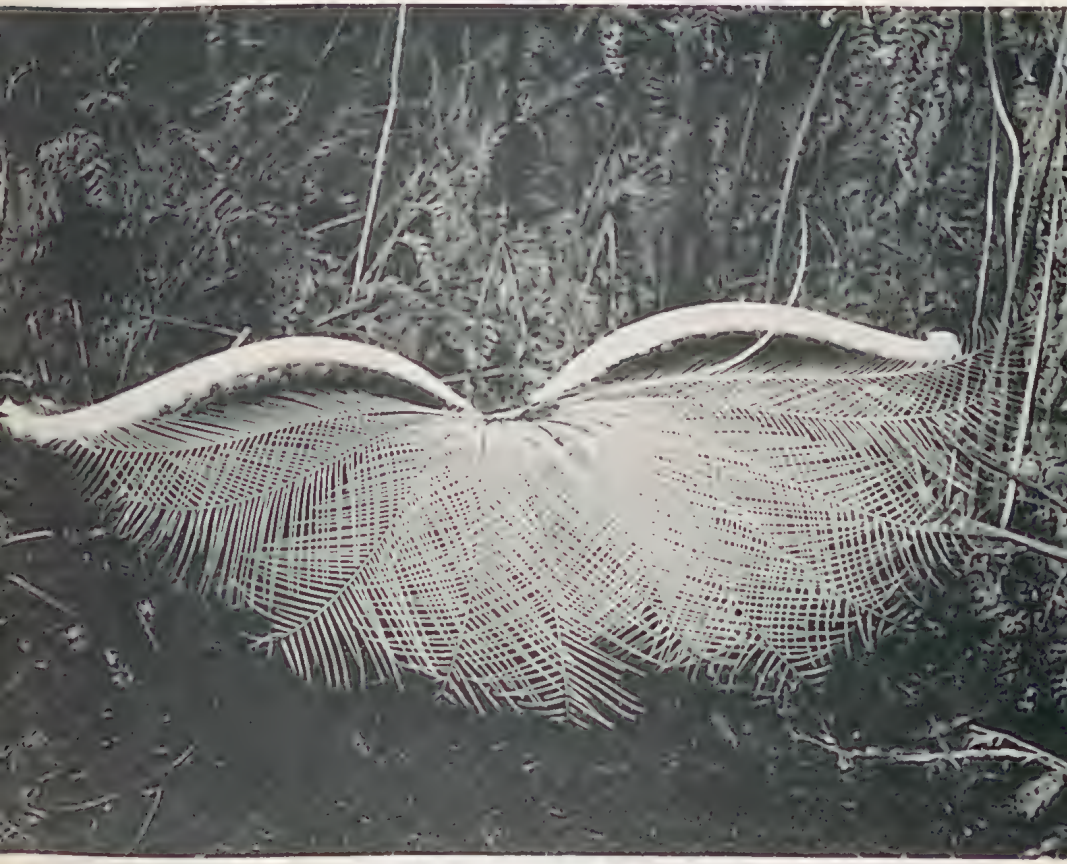
F.N.C.V.

the VICTORIAN NATURALIST

Vol. 86, No. 10 October, 1969



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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 13 October—General Meeting in National Herbarium, The Domain, South Yarra, at 8.00 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for evening—"Geology and Other Aspects of Flinders Island", Mr. Keith Darragh, Palaeontologist—National Museum of Vict.
4. New Members—

(a) *Ordinary:*

Miss S. Y. Askew, 30 Kellett Street, Northcote 3070. (Interest—Mammals.)
Mr. H. H. Bishop, 764 Centre Road, East Bentleigh, 3165. (Interests—Botany and Microscopy.)
Mrs. R. Byass, 23 Kingston Road, Surrey Hills 3127.
Sunday Reed, "Heide", Bulleen 3105.
Mrs. D. M. Schnabl, Alva Avenue, Park Orchards 3114. (Interest—Botany.)
Mrs. M. Wolf, 37 Windsor Avenue, Bentleigh 3204.
Miss J. Woodley, C/o Nurses' Home, Prince Henry's Hospital, Wells Street, Melbourne 3004. (Interests—Mammal Survey, Microscopy.)

(b) *Joint Ordinary:*

Dr. E. W. Brentnall and Mrs. H. M. Brentnall, 70 Victoria Crescent, Mont Albert 3127. (Interests—Botany, Birds, Marine Biology.)
Miss H. Ford and Miss E. Lowe, 36 Studley Street, Maidstone, 3012.
Mr. & Mrs. A. Godward, Flat 2, 60 O'Shanassy Street, North Melbourne 3051.

(c) *Country:*

Mr. C. M. O'Donnell, "Pink Earth", Porepunkah, Vic. 3740. (Interest—Mammal Survey.)
Mr. G. Swan, 112 Waratah Parade, Narraweena, N.S.W. 2099.

5. General Business
6. Nature Notes and Exhibits.

Monday, 10 November—Aboriginals of North and Central Australia, Sir Baldwin Spencer's films of 1913 to illustrate subject.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 15 October—Microscopical Group Meeting.
Friday, 31 October—Hawthorn Junior F.N.C. in Hawthorn Town Hall at 8 p.m.
Monday, 3 November—Entomology and Marine Biology Group Meeting.
Wednesday, 5 November—Geology Group Meeting. Subject: "Geological Literature, Old and New" by Mr. G. Carlos.
Thursday, 6 November—Mammal Survey Group Meeting in Fisheries and Wildlife Dept. Library at 7.45 p.m.
Friday, 7 November—Preston Junior F.N.C., 251 High Street, Preston, 8 p.m.
Thursday, 13 November—Botany Group Meeting.
Friday, 14 November—Montmorency District Junior F.N.C. Meeting in Scout Hall, Petrie Park, Montmorency, at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, 19 October—Cardinia Creek. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.50. Bring one meal.

Tuesday, 4 November—President's Picnic. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.80. Bring one meal and a snack. Bookings with excursion secretary.

Friday, 26 December, to Sunday, 4 January—Mt. Beauty. A coach has been chartered for this excursion which will remain with party for use in day excursions to the Bogong High Plains, Mt. Hotham and other places. Accommodation has been booked at the Mt. Beauty Chalet for the coach party at $6.00 per day dinner, bed and breakfast with picnic meals available at 50 cents. The inclusive coach fare of $20.00 should be paid by the November general meeting to the excursion secretary all cheques being made out to Excursion Trust. Accommodation to be paid for individually.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

F.N.C.V.

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Front Cover:

The display of the Lyrebird is always breathtaking, no matter how often one watches; and the cover illustration shows the famous "Spotty" giving one of his last performances before his unfortunate death.

On the Australasian Chelidae (Chelonia)

by E. H. Blackmore

Boulenger's Catalogue (1889) has for many years been a standard taxonomic work on the Australian Reptilia, and on the Chelidae in particular. However, it has now become apparent that the principles on which that work was based are largely out of date. This article is an attempt to tentatively revise the interspecific relationships of certain members of this group.

There can be little doubt that *Chelodina fitzinger* is much the most distinct Australasian chelid genus. In its very large cervical length, small parietals, weak mandible, enclosed intergular and four-clawed manus, Chelodina is set off sharply from the other three genera, Emydura, Elseya and Pseudemydura. Consequently its generic status cannot be questioned.

Goode (1967) transferred *latisternum* and the related *novaeguineae* from *Emydura* to *Elseya*. His definition of *Elseya* is to some extent preferable to that of, for example, Wermuth and Mertens (1961), and has been adopted here, but I am inclined to think the *Elseya* and even *Pseudemydura* cannot be maintained as generically distinct from *Emydura*. The differences between these genera (in intergular size, rugosity of neck skin, etc.) are certainly differences of degree only, while, as Goode (1967) has pointed out, presence or absence of a median alveolar ridge is not a character of major importance. However, I have retained Goode's arrangement, for the present at least.

Chelodina fitzinger

1826. *Chelodina fitzinger*. Type *Testudo longicollis* Shaw.

This genus includes two more or less well defined groups, typified by *C. longicollis* and *C. oblonga*. There is no evidence that the two groups contain more than a single species each.

Chelodina longicollis (Shaw).

1793. *Testudo longicollis* Shaw. New Holland = nr. Sydney, N.S.W.
1835. *Chelodina novae-hollandiae* Dumeril & Bibron. New name for *longicollis* Shaw.
1855. *Chelodina sulcifera* Gray. Australia.
1856. *Chelodina sulcata* Gray. Australia.
1888. *Chelodina novae-guineae* Boulenger. Katav R., Papua.
1914. *Chelodina steindachneri* Siebenrock. Marloo Station, DeGrey R., W.A.
1922. *Chelodina milly-millyensis* Glavert. Milly-Milly Ck., Murchison R., W.A.

Geographically, *longicollis* has a Basso-Torresian distribution somewhat similar to that of the terrestrial marsupial *Petaurus breviceps* Waterhouse. The species probably exhibits only clinal variation; in texture of dorsal neck skin, degree of recurving of marginals, depth of carapace and plastral width, *novaeguineae* is intermediate between longicollis s.s. and *steindachneri*. Consequently no subspecies are here recognized.

Range: northern and eastern Australia, south in the east to Adelaide, and in the west to Geraldton; not as yet recorded from the Kimberleys; southern New Guinea; Roti, nr. Timor; doubtless elsewhere in Indonesia.

Chelodina oblonga Gray.

If *Chelodina longicollis* poses unusual taxonomic problems, *C. oblonga* does not. At present four subspecies can be justified; Goode (1967) believed *siebenrocki* was identical with *rugosa*, and Gray (1844), Worrell (1961) and numerous other authors have included *rugosa* in oblonga ss., but in both cases there seem to be sufficient differences to warrant subspecific separation.

C. oblonga oblonga Gray.

1841. *Chelodina oblonga* Gray. Western Australia = nr. Perth.
1855. *Chelodina colliei* Gray. Swan R., W.A.
South-western Australia from Moore R. to Albany.

C. oblonga expansa Gray.

1857. *Chelodina expansa* Gray. Australia.
Murray-Darling Basin: western N.S.W., northern Vic., south-eastern S.A., southern Qld.

C. oblonga rugosa Ogilby.

1890. *Chelodina rugosa* Ogilby. Cape York, Qld.
1915. *Chelodina intergularis* Fry. Australia.
Arnhem Land; northern Qld.

C. oblonga siebenrocki Werner.

1901. *Chelodina siebenrocki* Werner. German New Guinea. New Guinea.

Elseya Gray.

1867. Elseya Gray. Type *Chelymys dentata* Gray.

Only two species of *Elseya* will be recognized here, as latisternum and novaeguineae contrast with dentata in having a more V-shaped rostrum, no-alveolar ridge, pointed cervical tubercles and a broader carapace; the depressed and posteriorly serrated carapace of latisternum may possibly be a paedomorphic character.

Elseya dentata (Gray).

1863. *Chelymys dentata* Gray. Victoria R., N.T.
1871. *Euchelymys sulcifera* Gray. North Australia.

Judging from the available information, it seems probable that dentata is continuously distributed in northern Australia. This is the typical Torresian distribution pattern; it has been customary to distinguish subspecies within species of this type on a politico-geographical basis, but closer study usually reveals clinal variation only. Most occur in New Guinea, though *Pseudomys delicatulus* (Gould) is an exception.

Range: probably throughout northern Australia from Gympie to Broome.

Elseya latisternum Gray.

E. latisternum latisternum Gray.

1867. *Elseya latisternum* Gray. C. York, Qld.
1871. *Euchelymys spinosa* Gray. N. Australia.
1931. *Emydura signata* Ahl. Brisbane, Qld.
North-eastern Australia, south to about Grafton.

E. latisternum novaeguineae (Meyer).

1874. *Platemys novae-guineae.* Meyer. New Guinea.
1911. *Emydura schultzei* Vogt. German New Guinea = Tami, N.E. New Guinea.
1914. *Emydura branderhorsti* Ouwens. South New Guinea.
Throughout New Guinea.

Emydura bonaparte.

1836. *Emydura bonaparte.* Type *Hydraspis macquarrii* Gray.

Apart from the dubious *E. australis*, only one species seems to be included in the genus: *E. macquarrii.* As in the case of *Chelodina*, it is impossible to justify the specific status currently given to other taxa.

Emydura macquarrii (Gray).

Some authors have regarded krefftii as merely a clinal variant of macquarrii; but as the Great Dividing Range should provide an effective distribution barrier, krefftii is probably subspecifically distinct.

E. macquarrii macquarrii (Gray).

1831. *Hydraspis macquarrii* (sic) Gray. Macquarie R., N.S.W. Murray Basin; western N.S.W., northern Vic., south-eastern S.A.

E. macquarrii krefftii (Gray).

1871. *Chelymys krefftii* Gray. Burnett R., Qld.
North-eastern Australia south to Kempsey, N.S.W.

E. macquarrii subglobosa (Krefft).

1876. *Euchelymys subglobosa* Krefft. Amama R., Papua.
1888. *Emydura albertisii* Boulenger. Katau R., Papua.
Throughout New Guinea.

? Emydura australis (Gray).

1841. *Hydrospis australis* Gray. Western Australia.
1842. *Hydraspis victoriae* Gray. Victoria R., N.T.

A revision of this species would be beyond the scope of this work. The maxilla, uniquely, extends back to totally cover the vomer, which casts doubt on its placing in *Emydura*; in view of colour and morphological variation, more than one species may be included here; while it has often been confused with *E. macquarrii krefftii*, which is superficially similar. However, some preliminary comments on the distribution will be given here.

Typically, *australis* occurs in the rivers of the Northern Territory and north-western Australia; I have no doubt that it also occurs in Queensland, where, however, it has been confused with *krefftii.* Mehely (1898) recorded what was probably this species from Papua. under the name of *krefftii*; it is also known from Cooper's Creek, in South Australia.

This central population is interest-

ing, but not unique, since two Torresian mammals—*Lagorchestes conspicillatus* Gould and *Rattus tunneyi* (Thomas)—are also recorded from the central region. However, neither is known to occur in New Guinea, which suggests that the Cooper's Creek and Papuan populations of "*E, australis*" may not be conspecific.

Range: probably throughout northern Australia. though not recorded east of Normanton, Qld.; Cooper's Ck., S.A.; Astrolabe Bay, Papua, and doubtless elsewhere in New Guinea.

Pseudemydura siebenrock.

1901. *Pseudemydura siebenrock*. Type *Pseudemydura umbrina* Siebenrock.

Pseudemydura umbrina Siebenrock.

1901. *Pseudemydura umbrina* Siebenrock. Western Australia.

1954. *Emydura inspectata* Glauert. Bullsbrook, W.A.

Williams (1958) has convincingly demonstrated the specific identity of umbrina and inspectata.

Range: south-western Australia from Moore R. to Albany.

Summary

The nomenclature of the Australasian Chelidae is reviewed in accordance with modern taxonomic principles. A number of species recognized by most recent authors are synonymized with Chelodina longicollis (Shaw), C. oblonga Gray and Emydura macquarrii (Gray). The generic status of Elseya Gray and Pseudemydura Siebenrock is questioned. Elseya novaeguineae (Meyer) is relegated to subspecific status under latisternum Gray. No revision of Emydura australis (Gray) is attempted.

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Indexes for Volumes 1 and 2 of this magazine, edited by the late P. Crosby Morrison, are available from the Book Sales Officer, F.N.C.V., at a cost of 30c ea.

Some Animated Figures

by Dick Hudson*

(Illustrations by Author)

"There are several other sources of enjoyment in a long voyage which are of a more reasonable nature. The map of the world ceases to be a bank: it becomes a picture full of the most varied and animated figures. Each part assumes its proper dimensions . . ."

Charles Darwin, *"Voyage of H.M.S. Beagle"*.

Most people enjoy a complete change of scene, and my wife and I looked forward greatly to a voyage from Australia to England over seas that we had never crossed to places that we had never visited. It was many years since we had been to sea and, as confirmed bird-watchers, we intended to make the best of this opportunity to study some sea-birds.

We left Melbourne on the S.S. Canberra, 45,000 tons, 27 July, 1966. We spent much of the following morning trying to identify places that we had visited by car on the east Gippsland coast as far as Mallacoota and Gabo Island. We passed the latter at 11 a.m. and soon after mid-day crossed the entrance to Twofold Bay; but after lunch we reached unfamiliar parts. Early in the day two Black-browed Albatrosses, *Thalassarche melanophrys*, accompanied the ship and a single Wanderer, *Diomedia exulans*, continued with us as far as Montague Island. By the time that we entered Sydney Harbour it was, unfortunately, dark, but we were able to follow our progress by the lights. We tied up at Circular Quay about 11.30 p.m.

As we were delayed in Sydney for several days, we had a splendid opportunity to take a last look at Australian land-birds. In the Botanic Gardens we found Jackie Winters, *Microeca leucophloea*, Magpie-larks, *Grallina cyanoleuca*, Welcome Swallows, *Hirundo neoxena*, White-plumed Honeyeaters, *Meliphaga penicillata*, and introduced Red-whiskered Bulbuls, *Pycnonotus jocosus*. At Taronga Park we met a family of Superb Blue-wrens, *Malurus cyaneus*.

Eventually we left Sydney at mid-day on 3 August. After we had cleared the Heads we noticed a Great Skua, *Catharacta skua*, among the flock of Silver Gulls, *Larus novae-hollandiae*, that flew in the wake of the ship, and about 4 p.m. there was a petrel, possibly Solander's, *Pterodroma melanopus*, flying with us on our beam, but too far away for certain identification. The two following days, whilst we traversed an oily Tasman Sea, were overcast with periods of light rain. During both days a couple of Wanderers were seen from time to time. We reached Auckland at 9 a.m. on the sixth.

Here, the most frequent gull around the harbour appeared to be the Dominican, *Larus dominicanus*; but whilst on shore a flock of Silver Gulls was seen in a grassed field. Driving in the hills at the back of the town we saw tall tree-ferns and extensive clumps of manooka tea-tree. In Auckland we found House-sparrows, *Passer domesticus*, a few Blackbirds, *Turdus merula*, and fewer starlings, *Sturnus vulgaris*. We were disappointed at failing to detect any indigenous, New Zealand land-birds.

Leaving Auckland that evening we set course for Nukualofa in the Tonga Islands. Two smallish dark al-

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Flying Foxes . . . in a group of *Casuarina equisetifolia.*

Fig. 1

batrosses were around the stern on the following day. They might have been the Sooty, *Phoebia fusca,* but could not be identified definitely. On the following day we saw no birds at all.

After passing through a long twisting channel between coral-reefs Nukualofa was reached at 9 a.m. on the ninth. We went ashore in one of the ship's boats and toured part of the island in a somewhat decrepit bus. Most tropical food-crops are cultivated, and there were many nondescript pigs, miniature goats, a few mongrel cattle and a surprisingly large number of ponies. Swifts resembling the Palm Swift, *Cypsiurus parvus,* of Africa and Asia, were seen among the trees and in a small tree near the beach was a bird that in Australia we should have identified as a Varied Triller, *Lalage leucomela.* A large party of Flying Foxes was photographed in a group of *Casuarina equisetifolia* at the "Bat Village". Back on board a tern, probably a Crested, *Sterna albifrons,* was the only sea-bird observed. We sailed in time to clear the channel before dark. For the next four days we were at sea. The first of these was our extra day, our second ninth of August, the result of crossing the date-line. Soon after mid-day we passed Fanuatapu Island (W. Samoa) to port. Except for two sightings of a small bird, flying low in the distance and soon settling on the sea, we encountered no birds during these four days.

On the afternoon of the thirteenth we tied up in Honolulu and made at once for the Foster Gardens. Unfortunately these closed at 4 p.m. and we only had about ten minutes inside. However, there and around the Iolani Palace we were able to watch the very common little Barred Doves, *Geopelia striata*, to identify Common Mynahs, *Acridotheres tristis,* House-sparrows and feral pigeons and to study the less common Bulbuls and Silvereyes. These last two were first seen on the flower spikes of a N. Queensland tree, the Octopus or Umbrella tree, *Brassaia actinophylla.* The bulbuls resembled the Red-whiskered, that we had known in India (and Sydney) and the Silvereyes, with the brownish wash on the flanks were remarkably like the Australian *Zosterops lateralis.*

On the following morning we journeyed by bus over the hills to enjoy

the view from Nuuanu Pail, descended to the beach at Kailua and returned to Honolulu by the coast road and Waikiki. Except for a patch of rain forest, the tree-trunks of which were draped with fine phyllodendrons, on our ascent, much of the vegetation consisted of introduced species, including eucalypts. Among the other tropical plants noticed in suburban gardens there were some magnificent varieties of hibiscus.

We sailed at 1 p.m. and, shortly after clearing Rabbit Island, we were able to identify five Brown Boobies, *Sula leucogaster*, flying low over the water. During the next four days the weather became gradually cooler and no birds were seen until we approached the entrance to Juan de Fuca Strait when four gulls appeared in the dusk. By 6.30 a.m. on the 19th we were tied up in Vancouver. The gulls around the quay appeared to be Herring Gulls, *Larus argentatus*, but on shallow water near the Lion's Gate Bridge was a party of smaller gulls in post-breeding and immature plumage that were probably Bonaparte's Gull, *L. philadelphia*.

Vancouver has a most beautiful setting enclosed as it is by wooded hills to the north and east. A little snow lingered on the higher peaks. The extensive parks add to the attractions of the town and we enjoyed a fine tour that took us up to the Cleveland Dam among the Douglas Firs, *Pseudotsuga menziesii;* Hemlocks, *Tsuga canadensis*; spruces, *Picea* sp.; Red Cedars, *Tsuga occidentalis*; maples, *Acer* sp.; and Dogwoods, *Cornus* sp. Some Barn Swallows, *Hirundo rustica*, were flying over the dam. On a baulk of timber in the harbour area stood a Great Blue Heron, *Ardea herodias*. In the Queen Elizabeth Gardens an American Robin, *Turdus migratorius*, was collecting worms in its beak to feed to its young and, in another park, a Common Crow, *Corvus brachyrhynchos*, watched carefully a man on a seat eating his lunch. A few House-Sparrows and many dark feral pigeons were present in the town.

We left Vancouver at 5 p.m., in time to watch our progress between Vancouver Island and the mainland coast where Canada meets the United States. The setting sun illuminated the snow of Mt. Baker, and just after dark we rounded the lights of Victoria. During the 20th. we proceeded south skirting the hazy coast and by 7 o'clock on the following morning, we had passed under the Golden Gate Bridge and were approaching our berth in San Francisco. Here the gulls were mainly the Californian, *Larus californicus*. We saw our first Brown Pelicans, *Pelecanus occidentalis*, a species that we were to meet several times in other ports. This pelican has the habit, unusual for the family, of diving for its prey like a gannet. Individuals are frequently attended by a gull apparently hoping to pick up an overlooked morsel; but although many dives were watched and the gull alighted as the pelican surfaced, we never saw the gull obtain any food. There was a Belted Kingfisher, *Megaceryle alcyon*, on the pier. On shore we saw three Snowy Egrets, *Leucophoyx thula*, paddling at Sausalito and House-Sparrows and a Barn Swallow in San Rafael. Feral pigeons were common in the city itself. On returning to the ship, we identified around the berth a Herring Gull and several Heerman's Gulls, *Larus heermanni*, a Royal Tern, *Sterna maxima*, and several Forster's Terns, *S. forsteri*. In the afternoon the mist came in through the entrance to the Bay. We left at 7 p.m. On the following day we tied up in Port Los Angeles just before noon. Many Brown Pelicans were seen diving in the harbour. They

were attended by one or two large gulls in brown, immature plumage. Here we saw some Heerman's Gulls, *Larus heermanni*, before leaving the ship to spend the afternoon at "Marineland", a place that all who are interested in natural history should visit if they have the opportunity. We were astonished to learn that porpoises, dolphins and even a False Killer Whale could be taught to perform in the way that that they do here and, in addition to the circus "turns", Marineland provides excellent facilities for viewing these mammals and many species of salt-water fish through glass panels in the walls of the enormous tanks. In the grounds we found Starlings, House Sparrows and feral pigeons. In addition there was a metallic, dark blue bird with a white iris and a longish tail, the outer webs of the outer feathers of which were widened towards the tip. This we identified tentatively as a Brewer's Blackbird, *Euphagus cyanocephalus*. After we had returned to the ship, we saw a party of Forster's Terns, a species that can be distinguished from other terns by the nature of its harsh call.

We sailed at 8 p.m. and during the following two days had only occasional glimpses through the mist of cliffs and mountains as we passed those parts of the Lower Californian and Mexican coasts that projected towards us. Some flying fish and porpoises were seen, but no birds.

On the 25th. we could see hills and green coastal flats to port and about 12.40 p.m. we entered Acapulco harbour and about 1.15 p.m. we anchored off the port. Nearby there were six Brown Pelicans standing on a group of rocks. Overhead were two female Magnificent Frigate-birds, *Fregata magnificens*. On shore we saw on a flat roof two Boat-tailed Grackles, *Cassidix mexicanus*, and a number of feral pigeons. No House-Sparrows were observed. Half a dozen eagles, possibly the Golden, *Aquila chrysaetus*, were circling high in the sky. During the day there was a considerable migration of *Catopsilia*-like butterflies. The Canberra sailed at dusk.

Early on the following morning we could see the distant shores and hills as we passed down the coast of Mexico, but after 11.30 a.m. we were out of sight of land. Except for a small white bird, too distant to identify, during the afternoon, we saw no large form of life. A large hawk-moth, 10 cm. in wing-span, was discovered under the games-deck roof. No land and only one distant bird was seen on the next day; but on 28

Tropical vegetation on the bank of the Panama Canal approaching Pedro Miguel lock.

Fig. 2

August we had much to interest us. We passed a number of islands and rocky promontories off the coast of Panama before we finally tied up in Balboa at 7.15 p.m. The tops of the islands were covered with forest, which in some cases clothed surprisingly steep slopes down almost to sea-level. We met several ships and were often accompanied by Brown Boobies. Approaching Balboa we saw four Brown Pelicans and a couple of Magnificent Frigate-birds before we passed under the bridge, the centre of which is 201 feet above the water. At dusk, bats were flying around the go-downs along the quay.

The next day, 29 August, was the highlight of the voyage: we passed through the Panama Canal, 42 miles from shore to shore. As we started to move with the assistance of a tug at 7 a.m., we noticed six Black Vultures, *Coregyps atratus*, flying around or resting on the roofs of the sheds. The thickly forested hills were shrouded in mist. Near the edge of the water there was lush tropical vegetation, a coarse "cane-grass", mangroves and clumps of bush. We saw an American Egret, *Casmerodius albus*, a race of the White Egret of Victoria, and small plover with much white in the open wing, as we entered the channel. After about four miles we came to the Miraflores lock, a double lock in each compartment of which the ship is lifted 27 feet. Ships are pulled into and out of the basins by electric "mules", and as the Canberra is the largest vessel to pass through the canal with only 3 feet of clearance on each side of the lock, these operations require great skill. On the short grass around the lock were many Boat-tailed Grackles. Nearby we saw several Brown Pelicans and thought them paler than those that we had seen further north. Nine white-rumped swallows, which we have failed to identify, were noticed perched on electric-light wires. Between one and two miles further on we came to the single Pedro Miguel lock which raised us to a total of 83 feet above sea-level.

After a short wait to allow another vessel to come out of the Gaillard Cut, our tug began again to tow us along. The cut is eight miles long and, at its narrowest part where the walls are high, 300 feet wide. Further on the banks are lower with trees, a canna-like plant and that curse of boggy patches in tropical pastures, *Imperata cylindrica*. We saw two Turkey Vultures, *Cathartes aura*, one Tern and a number of Swallows, *Iridoprocne bicolor*. There was also a Belted Kingfisher sitting on a light-buoy. Soon after passing Balboa we entered Gatun Lake where we were able to proceed under our own steam. The atmosphere was "steamy", the vegetation on the banks and small islands tropical, and the distant view was obscured by haze. The

Gatun Lake. ". . . vegetation on the banks and small islands tropical . . ."

Fig. 3

birds seen were Tree Swallows, Least Terns, *Sterna antillarum,* and Vigua Cormorants, *Phalacrocorax vigua.* As we approached the Gatun Locks, a series of three which dropped us to the level of the Atlantic, we saw an American Egret. Around the locks were Boat-tailed Grackles and other land-birds, including the white-rumped swallows which we had encountered earlier in the day. We also saw three unidentified sandpipers there and on the shore of Limon Bay. We tied up in Cristobal at 4.15 p.m., had a look around the town, and sailed at midnight.

On 30 and 31 August we sailed N.N.E. across the Caribbean Sea. On the first day we saw no land or birds; but on the second we passed Cape Maysi, on the eastern extremity of Cuba, during the morning, and a number of small islands and reefs, parts of the Bahamas group, in the afternoon. A few unidentifiable gulls were seen in the distance. Early in the morning of 1 September we were close to Nassau where we came to anchor at 6.45 a.m. Nassau, on New Providence Island, is the capital of the Bahamas, and during the northern winter is a popular resort for wealthy Americans. By the time that a tender had taken us ashore it was becoming warm, and after an hour's sightseeing we were ready to sample the local beer. At the first hotel that we entered we were told that the bar did not open until November! We made a small tour around the town by taxi, visiting two old historic forts, Government House and other places of interest. Although we saw no land-birds there were many Laughing Gulls, *Larus atricilla,* around the port.
We left Nassau about 6.15 in the evening, and by 6.30 in the morning of the 2nd were tied up in Port Everglades, on the coast of Florida, about 20 miles north of Miami. The harbour area is mostly reclaimed swamp-land and nearby, at Harbour Beach, are the winter residences of millionaires with parking places for their yachts and launches in the canal at the back and their cars in the front. We identified a Boat-tailed Grackle, a Mourning Dove, *Zenaidura macroura,* a small party of House-Sparrows and some feral pigeons on shore. Amongst the trees we recognized *Casuarina equisetifolia,* coconut and other palms. There were many Laughing Gulls around the port and we saw one tern, probably a Forster's.

Soon after leaving the harbour entrance at 4.30 p.m. we *saw* the edge of the Gulf Stream: there was a distinct line of demarcation between the cloudy water along the coast and the clear, deep blue of the Stream. An hour and a half later we had a fine view of a waterspout off the starboard beam.

The rest of our voyage, across the Atlantic Ocean, was ornithologically disappointing. We were passing well to the south of the main post-breeding dispersal areas of the important North Atlantic pelagic species, such as the Kittiwake, *Rissa tridactyla,* and Fulmar, *Fulmarus glacialis.* During the first four days we saw no birds at all. We had a distant glimpse of Bermuda to the north of us at 7.30 a.m. on 4 September; but no other land was seen until we were approaching the Isle of Wight. On 7 September we saw a couple of birds flying low over the water too far away to attempt identification, and at 3 p.m. on the 8th, two distant, large greyish birds with long narrow wings were probably, on the basis of their flight pattern, Cory's Shearwater, *Procellaria diomedea.*

We arrived in Southhampton at 7.15 a.m. on the tenth. So ended a most enjoyable voyage which had lasted six and a half weeks.

Book Review

The Drummonds of Hawthornden

by Rica Erickson

8½" x 5½". Pp. 183, plates 16 (four in colour). Lamb Paterson Pty. Ltd., Osborne Park, W.A., 1969. Price $5.50

No person contributed more to the investigation of Western Australia's exciting and very colourful flora than James Drummond. At the age of 45, he arrived with the first settlers on the Swan River in June 1829 and thereafter devoted much of his remaining 34 years to exploratory work from Geraldton to Cape Leeuwin, inland to Kellerberrin, the Stirling Range, and along the southern coast as far east as Doubtful Island Bay. A prolific correspondence developed between Drummond and Sir William Hooker at Kew (England) to whom the former sent specimens of hundreds, if not thousands of species, many being new to science and now bearing the epithet *drummondii* after their discoverer. Prodigious quantities of seed were also shipped to nurserymen in Britain and western Europe. There is a brief account of this indefatigable explorer in the *Australian Encyclopaedia* Vol. 3 (1958); but Australian botanists have long wished for a worthy biography, setting out in detail the numerous journeyings of Drummond. That hope has now been fulfilled by the able pen of Mrs. Rica Erickson, whose illustrated books on insectivorous herbs, trigger-plants and the orchids of Western Australia are already well known and popular.

Living for many years at Bolgart, not far from Drummond's home-site, "Hawthornden", in Toodyay, Mrs. Erickson became fascinated by the story of this pioneering family, as rich and varied as any in a new colony and much better documented than most. A flair for historical writing, artistic talent and a deep interest in botany have qualified her to produce *The Drummonds of Hawthornden*. Congratulations go to both authoress and publisher for an excellent book that holds one's interest from cover to cover. Not only is this a good biographical account of an important botanist but, as the dust-jacket truthfully observes, it is "a mirror of the times . . . a lively-written social history". With great sympathy and understanding, the hopes and fortunes, the frustrations and calamities of pioneer settlers are laid bare. There are gripping accounts of drought, fire, flood, heavy stock losses caused by toxic native plants, and encounters with natives, both friendly and hostile. Drummond's youngest son and companion on many excursions, Johnston, was murdered by an aboriginal in July 1845. If there be a theme underlying the story, it is surely the triumph of a human spirit over crippling deprivations, personal tragedy, heart-ache and the "tyranny of distance" in those times.

On several of his earlier expeditions James Drummond had joined forces with Ludwig Preiss, the visiting German botanist, and with John Gilbert who was collecting ornithological material for John Gould (in 1839 and 1842), his comments on these and other notables being of historic interest. In addition to wildflowers, he was captivated by the mosses and fungi of the West, and he made extensive collections of these lowly plants for

W. J. Hooker. After Drummond's death in March 1863, his son James shipped his rich private herbarium to Baron von Mueller in Melbourne, and to this day it remains a priceless asset in the National Herbarium of Victoria.

Mrs. Erickson tapped every possible source for her documentary material, and the number of references (six pages) listed at the end of the book is impressive. Of basic value were the 60 odd letters by James Drummond to Sir William Hooker, preserved at Kew Herbarium, while several old diaries in the archives of the Battye Library of Western Australia furnished a rich store of information. Four delightful colour plates by the authoress portray flowers that held a particular appeal for Drummond; these are discussed at length in the quotations from his letters. It is a pleasure to read a book so attractively arranged and so free of typographical flaws as this. One can commend it with enthusiasm to anyone interested in Australian history, exploration or plant-life, and may we express the hope that it will keep green the memory of a remarkable old botanist to whom the Commonwealth owes so much.

J. H. Willis,

National Herbarium of Victoria

"Flowers and Plants of Victoria in Colour"

This fine publication is still available; and would make a fine present. Secretaries of affiliated clubs may place their members' orders with Mr. D. McInnes, Treasurer of the F.N.C.V.

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The Bilby, *Thylacomys Lagotis* in Victoria

by N. Scarlett

In the latter part of last century, James Dawson (1881), collected extensive vocabularies for three Western District Aboriginal dialects: *Dja:-bwurung*, *Gurn'gobanud*, and *Bi:-gwurung** (see map). *Gurn'gobanud* and *Bi:gwurung* were closely related dialects of the *Dhau'urdwuru* language (Mathews 1904); *Dja:bwurung* was very similar to the languages of north-west Victoria, such as *Djadjala* and *Wemba-wemba* (Hercus 1966).

Dawson's vocabularies included long lists of mammals, birds, insects, fish and reptiles, almost 400 separate entries all told. Under "Quadrupeds" he recorded an animal called in English"Jerboa or Bilboa", and known in all three dialects as *Ya:gar*. In his book he states that the *Ya:gar* was once numerous, living in mound communities on the plains.

There seems to be a strong possibility that the animal was actually *Thylacomys lagotis*: Dawson's "Bilboa" is an older or variant form of "Bilby".

Dawson gives its colour as brown and black, a fair approximation to the Bilby's fawn-grey body and fawn-grey, black, and white tail (Marlow, 1962).

Thylacomys lagotis has never been collected in Victoria. Krefft (1862) only collected specimens near Gol Gol in New South Wales, but he implied that it was once found south of the Murray. Marshall (1966), discussing the Western District of Victoria, says: "With the trees and the undergrowth went the Flying Squirrels, the Bilbies, the Bandicoots, the Potaroos, the Paddymelons and all the others." Dawson's record provides some evidence to support Marshall's inclusion of the Bilby in the fauna of the Western District.

Unfortunately, *Thylacomys* has *not* yet been found among the sub-fossils of the Basalt Plains (Wakefield, 1964); this suggests that it may have had a rather localized distribution, perhaps in the drier parts of the area.

Over most of its former range the Bilby is now extinct, and it survives only in the more remote parts of the Northern Territory, Western Australia, and Queensland. There is therefore a tendency to regard it as entirely inland in its distribution. However, Wood Jones (1923) mentions that it was numerous in the immediate neighbourhood of Adelaide as late as the 1890's; and it was also present at Nalpa at Lake Alexandrina. The habitat of the Bilby in the centre is on plains of *Triodia* (Spinifex) and Mulga; in the south it was apparently found in savannah woodlands and tussock grasslands.

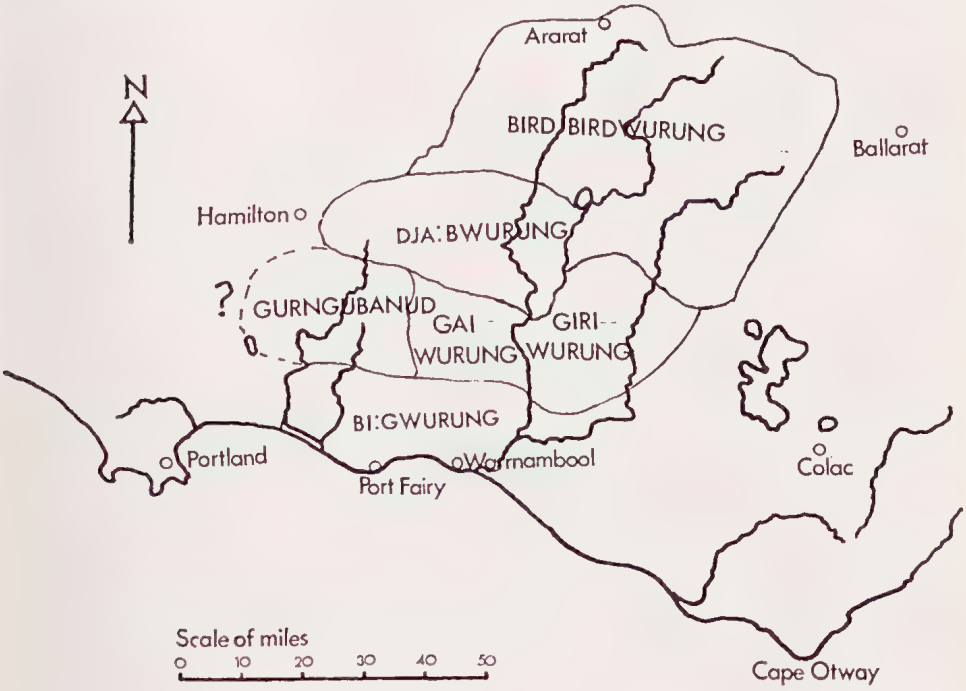
It must be emphasized that there are other possible interpretations of Dawson's record. The alternative English term for the animal—"Jerboa"—was often applied to species of *Bettongia*, small members of the Kangaroo family (see Wakefield, 1967). If the *Ya:gar* was a *Bettongia*, Dawson's description fits the burrowing *Bettongia lesueur* remarkably well. This animal has been recorded from several sub-fossil sites in the Western District, and Wakefield (1964) suggests it may have been present during the early period of settlement. Another, but rather more remote possibility is that the animal was the

* The system of transcription is the phonemic system of Capell (Sydney), adapted for general publication. Ng is as in ha*n*ger; ngg as in a*n*ger; a colon indicates vowel length.

nest-building *Bettongia gaimardi*. Almost nothing is known about the habits of this mammal. If Dawson's "mound communities" were large aggregations of nest-material, rather than warrens of soil, he may have been referring to this animal.

Regardless of the correct interpretation of this particular record, a thorough examination of Aboriginal vocabularies for Victoria may well yield valuable supplementary information of past mammal distributions.

Apart from its biological interest, the Bilby is remarkable for the variety of its local names, which throw some light on the way popular names for native animals have developed. The name most commonly used today—Bilby—comes from western New South Wales; Mathews (1902) records it as *bilba*, "a small kangaroo rat" for the *Yualeai* language, and it was probably also used in the related languages, *Gamilaraii*, *Wongaibon* and *Wiradhuri*, spoken over vast areas of the West. The word was adopted by the colonists during the great pastoral expansion into the area during the 1830's and 40's, and from there carried all over Eastern Australia. Overland contact between the Eastern States and South Australia was minimal in the early days of the South Australian Colony; the colonists in South Australia adopted the local Aboriginal term for *Thylacomys*. The *Narran'ga-Gaurna* word *binggu* (Tindale, 1936) was anglicised as "pinkie", which is (or rather was) the common



DIALECT DISTRIBUTION

name in the south of South Australia. In the centre the settlers adopted another native name—the *Wonggangaru, Arabana* or *Gugarda-dhalga.* In various forms—"thulka", "talkie" "dulgite"—it remains in use.

The Aboriginal Names of the Bilby

It is interesting to note that Dawson's apparent confusion of *Thylacomys lagotis* and the Bettongs was shared by the Aborigines of South-West Australia. Wood-Jones mentions that the term *burdi* was often applied to both *Thylacomys lagotis* and *Bettongia lesueur* in the inland parts of Western Australia. For this reason, Krefft's record of a Maraura (Darling River language) term *Yego* (c.f. Ya:gar) for *Thylacomys lagotis* cannot be used to identify Dawson's unknown animal.

ACKNOWLEDGEMENTS

I would like to acknowledge the help of Mr. J. Edge and Mr. F. Shirrefs of the Warrnambool Field Naturalists Club in drawing up a map of the Aboriginal dialects mentioned.

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"The Coolart Story"

AN EPIC OF MAN-MADE CONSERVATION

by W. A. Davis

The Coolart story is a 50-minute colour sound film in super 8 m.m. produced by William A. Davis for Survey Somers and the Victorian Ornithological Research Group.

Introduction

In these days of supposed human progress conservation is a word gaining in daily importance. When related to flora and fauna my broad definition of conservation would be:

"To preserve for future generations our unique flora and fauna by the careful preservation of habitats."

Protection of species in itself is important but the saving of the homes or habitats of these species is absolutely imperative.

We humans in our endless search for the material things of life tend to completely ignore basic realities of existence on this planet. Many of these realities are concerned with nature and her delicate balance. We irresponsibly contaminate our pastures and countryside by the indiscriminate spraying of deadly pesticides, we pollute our streams, rivers, lakes and harbours with toxic effluents. Even the very air we breathe is no longer pure and fresh. *We are in fact slowly destroying our own human environment.*

Members of our native fauna are the first victims of all this human thoughtlessness, particularly our beneficial water birds. Swamps are continually being drained in the convenient name of progress; thus the breeding habitats of these birds slowly disappear. As this happens we are forced to use more and more pesticides to control our agricultural pests, and so nature's balance is slowly altered. A vicious circle develops, with the long-term losers being ourselves, the human race.

I ask the question, "would it not be better to revert back to natural control before the point of no return is reached?" A possible solution would be the creation of hundreds of conservation areas across the country to encourage the survival, and increase of these beneficial birds. The Coolart Lagoon is such an area.

The "Coolart Lagoon"

Here we have a unique creation of man. A classical example of what could be achieved on hundreds of farms throughout our rural areas by education of our farmers in the immense value of birds such as Ibis in pest control.

The potential of Coolart as a research area is without parallel anywhere. The fact that water levels could be controlled by man provides exciting possibilities in the quest for vital information on breeding colonies of Ibis, Spoonbills, Ducks, and other water birds. This is the information which the Fisheries and Wildlife Dept. is currently seeking.

From an educational viewpoint Coolart is ideally situated. Its close proximity to the Victorian Education Dept. children's camp at Somers provides nature study lessons for thousands of children annually from all over Victoria. The fact that these children can be shown breeding colonies of our most beneficial birds without even getting their feet damp

makes the preservation of this lake imperative. These children are the future naturalists, and the prospect of sowing the seeds of interest in only one child in every hundred is in itself sufficient reason for the preservation of Coolart Lagoon.

The Film—*"The Coolart Story"*

The film is not presented as a photographic epic. The purpose of the film is to make as many people as possible aware of the existence of Coolart, of what has been achieved so far, of what could be achieved in the future, and finally the doubtful long-term future of the lagoon in view of the tremendous development and soaring land values occurring in the Westernport district.

Systematic bird study in the Somers district and at Coolart has been carried out by members of Survey Somers as part of the activities of the Victorian Ornithological Research Group. This survey work commenced in 1961 and still continues. The film is possibly the culmination of all this activity. It took over twelve months of regular weekly filming to provide the necessary material.

After explaining the whereabouts of Coolart and tracing the early history, the film commences with Autumn and proceeds season by season as the year passes. The species inhabiting the lagoon are shown. When Spring arrives without sufficient rain to raise the water level, tension mounts until in early September over an inch of rain provides the stimulus, and breeding of various species commences. The "Whitey" sequence follows; and the incubation, hatching, and growth to maturity of "Whitey" the White Ibis are followed week by week until he leaves the rookery. A short segment on the Royal Spoonbills follows.

Finally an urgent plea is made for the future of the area. The lagoon was created by the late Mr. Tom Luxton. It stands as a tribute to the foresight and dedication to conservation of this fine man. He was also an ardent bird lover, particularly of water birds. He took great interest in our survey activities and was delighted with the Coolart story. It was indeed sad that he passed from this world only one week after seeing the completed film in early April 1968. The film is humbly dedicated to the late Tom Luxton as a token of our sincere thanks. The property is currently being run by Mr. and Mrs. Roffey, daughter and son-in-law of Tom Luxton. They are maintaining the interest shown by Tom and have indicated that the lagoon will be retained for as long as is humanly possible.

The film will be made available to interested parties in natural history and conservation by application to—William A. Davis, 39 Fairlie Avenue, Macleod, 3085, Melb. Phone 43 2112.

. . . . .

TO AFFILIATED CLUBS

Will members of affiliated clubs, who receive the *Victorian Naturalist*, please direct the attention of officers to the following message:

Co-operation

It has been evident for a long time that more effective study of all aspects of Australian nature could result from a simple arrangement between town and country. We now have affiliation in almost all the State and some beyond it.

Outside Melbourne, opportunity for frequent observation is greater. In Melbourne, we have the institutions where knowledge is stored.

The Council of F.N.C.V. is prepared to appoint a committee, with a representative from each study group, for liaison with affiliated clubs.

Each club is invited to appoint one liaison officer.

The liaison officer of the affiliated club would pass on requests and reports of work and results. For F.N.C.V. a convener would receive requests and reports from liaison officers of affiliated clubs and pass them on to his members. He would also collect and pass on to the affiliated club or clubs the requests, suggestions and answers from F.N.C.V.

All concerned are assured that the work will be light for some years. When it increases, it should be easy to enlist and instruct more helpers.

Mr. A. J. Swaby, 20 Grovedale Road, Surrey Hills 3127 will act as convener in the initial stages and correspondence should be addressed to him.

PROPOSED CONSERVATION COUNCIL OF VICTORIA

Narrative

Public interest in conservation of natural resources in Victoria and the Commonwealth at large has been strong for years. Evidence for this is seen in the existence of the large number of clubs and societies devoted to some particular aspect of conservation, many of them having enjoyed an active and effective life for many years.

There is evidence, too, that this interest and activity is steadily increasing, but it is also evident that the impact these societies have, firstly on community thinking, and secondly on government, industrial and private action, is not as great as it might be because each has its own special interests and none can speak with authority for the whole conservation movement.

One of the major strengths of the conservation movement in Victoria is this diversity of active groups, but here also lies a major weakness. In Victoria we suffer from the fact that we cannot speak with one voice when issues of major public concern are being debated.

It is obvious that every effort should be made to overcome this inherent weakness by the establishment of an administrative structure which will allow for effective co-operation and co-ordinated activity. This need has been amply demonstrated in recent months by the public debates on the Botanic Gardens and the Little Desert.

The establishment of the Australian Conservation Foundation has met this need at the national level but it seems unlikely that the A.C.F. will set up state committees in the near future and therefore we cannot look to this organisation to provide the basis for co-operative effort in Victoria.

Professor A. Swanson of the U.S.A., on A.B.C. as Guest of Honour recently said, "There is a need for more unity and effective co-operation between the private organizations interested in conservation. Australia has scores, probably hundreds of non-government organizations concerned with nature protection, birds, forests, national parks, soil and water conservation. These organizations are nowhere near as effective as they could be if they banded together and concentrated attention on their common interests—of far greater import-

ance than the differences that separate them."

In an attempt to bring about the establishment of some organization which could provide for this concentration of effort, an invitation was sent by the Director of the Natural Resources Conservation League, Mr. G. T. Thompson, to many conservation societies to send their representatives to a meeting held at the offices of the N.R.C.L. at Springvale on Thursday, 24 April.

The response to this invitation and the discussion between the representatives attending the meeting was very encouraging. At that meeting of some 45 individuals, members of 27 organizations, the following resolutions were approved:

1. That those present at the meeting approve the formation of an *ad hoc* Committee to consider the establishment on a permanent basis of a co-ordinating organization of a name to be determined.

2. That a Committee of five be appointed with power to co-opt. And in accordance with that resolution the following Committee was appointed: Mr. Ros. Garnet, Hon. Secretary, Victorian National Parks Association; Mr. D. J. Lee, Hon. Secretary, Field Naturalists' Club of Victoria; Dr. D. M. Calder, Senior Lecturer, Botany School, Melbourne University; Mr. H. G. Bleakley, President, Native Plants Preservation Society of Victoria; and Mr. G. T. Thompson, Director, Natural Resources Conservation League of Victoria, Convener. Mr. A. L. Godfrey, Assistant Organiser, Natural Resources Conservation League of Victoria, was appointed to act as Secretary.

3. It was also resolved that the *ad hoc* Committee report to a general meeting to be held on the fifth Thursday in October (30/10/69) at the Brymay Hall, Church Street, Richmond.

Subsequently the *ad hoc* Committee met at weekly intervals during May and June and the preamble to their report follows.

Preamble

The proposed Conservation Council would provide a means for the co-ordination of the views and activities of conservation *organizations* in Victoria in a concerted effort to maintain and improve the quality of the human environment.

Membership of the Council by individuals is considered to be neither desirable nor necessary, but organizations interested in conservation should be afforded an opportunity to join and appoint voting delegates.

The Council must not be considered an off-shoot or part of any existing organization but should be completely free and independent.

It is envisaged that a member body might, as it thinks fit, take independent action on any matter regardless of the decisions of the Council, but in doing so it should not involve the Council.

To function as an autonomous body finance of the order of approximately $12,000 p.a. would probably be required.

All interested people are invited to attend at Brymay Hall, Church Street, Richmond, on Thursday, 30 October, 1969.

Field Naturalists Club of Victoria

General Meeting

8 September, 1969.

Vice-President, Mr. T. Sault, was in the chair and about 75 members and visitors were present. Visitors and new members, Mr. Bishop, Mr. Wolfe and Miss Lowe, were welcomed by the Chairman.

The minutes of the August meeting taken as read on the motion of Mr. Woollard, seconded by Mr. Zerkler.

New members, whose applications had been approved by Council since the last meeting, were elected on the motion of Mr. R. G. Taylor, seconded by Miss Woollard.

Correspondence was received from Mr. Swaby on the subject of the Little Desert and from Miss Susan Whitlock asking for information about Falls Creek. In answer, Miss Whitlock was referred to reports in the "Victorian Naturalist".

The subject for the evening was "The Coolart Story", a sound-film, photographed and produced by Mr. W. Davis. A detailed account of the film and its story appears elsewhere in this issue. A short film of a Royal Ornothologists' Union annual bird banding expedition to Mud Island in Port Philip Bay was shown also. The Chairman thanked Mr. Davis for providing an opportunity for the Club to see his intensely interesting film, which all present endorsed by acclamation.

General Business

Mr. R. G. Taylor reported on the Public Meeting over the Little Desert held in the Melbourne Town Hall, to publicly protest against the Little Desert Settlement Scheme. A committee, to be known as "Save our Bushlands Action Committee", was formed. Mr. Taylor, as Treasurer of this Committee, will be glad to receive donations from those sufficiently interested, to cover expenses, such as advertising, which must be incurred through publicity. A deputation is to seek an interview with the Premier of Victoria. Highlights of the speeches at the meeting are to be published in pamphlet form and should be available shortly.

Mrs. Woollard, supported by Messrs. Ros Garnet and J. Baines, said that credit should be given, and placed on record, of the sympathetic publicity given by all the Melbourne newspapers in the controversy over the Little Desert matter.

Mr. Taylor brought to the notice of the meeting, the announcement in the newspapers, that the Government had abandoned the scheme to establish a licensed restaurant in the Royal Botanic Gardens.

The Secretary reported the following:

The oil industry is to publish a survey of the effects of oil pollution in coastal and estuarine waters.

The M.M.B.W. has asked for the Club's co-operation with their research work. Information is particularly asked for about the Maribyrnong Valley.

A meeting will be held at Brymay's on 30 October, 1969, in connection with a proposed "Conservation Council of Victoria".

Concern by a number of people is held because of the considerable subdivision of forested areas which is taking place in the Woori Yallock area; and between there and Yellingbo.

The Chairman reported that the Nature Show, held in Lower Melbourne Town Hall on 1, 2 and 3 September, 1969, was highly successful. Attendance at 6,980 was the second highest to date, the record being 7,300 in 1967. The Publications Stall under Mrs. Strong returned gross takings of just over $500.

Mr. McInnes told the meeting that he would be unable to continue as a member of the Nature Show Committee and tendered his resignation. He would, he said, continue to work for the Show but not as a committeeman. Mr. J. Baines spoke of the splendid work done by Mr. McInnes in connection with the Nature Show over a number of years and moved that:

"This Club records its greatest appreciation of the splendid work done this year and in the past years by Mr. McInnes in connection with the Nature Show."

In seconding the motion, Mr. Woollard also spoke of Mr. McInnes' excellent and enthusiastic work. The Meeting carried the motion by acclamation.

Exhibits

Mr. Lee showed a sample of Brown Coal from Pawong Colliery, near Bacchus Marsh.

Mr. Alan Morrison showed a large Cup Sponge about 12" diameter and 12" deep, found at Broom, W.A., during his recent trip to North and West Australia.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10 November—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—Aboriginals of North and Central Australia, illustrated with Sir Baldwin Spencer's films which were taken in 1913—the first ever made of our Aboriginals.
4. Election of new members.

Joint Ordinary:

Mr. & Mrs. J. A. Rouel, Flat 1, 4 Seaview Avenue, Hampton, 3188. (Interest—Marine Life.)

Ordinary:

Miss E. Griffiths, 145 Atherton Road, Oakleigh, 3166. (Interest—Fauna Conservation and Entomology.)

Miss V. Meikle, Flat 8, 134 Neerim Road, Glenhuntly, 3163. (Interest—Mammal Survey and Entomology.)

Mrs. L. Murphy, 2 Kemsley Court, Hawthorn, 3123. (Interest—Botany.)

Miss M. Wark, Flat 8, 159 Curzon Street, North Melbourne, 3051. (Interest—Botany and Mammal Survey.)

Mrs. M. E. White, 29 Cornell Street, Camberwell, 3124. (Interest—Botany and Geology.)

Country:

Mr. J. D. Myers, "Rosehill", Myrniong, Vic., 3341. (Interest—Geology.)

5. General Business.
6. Nature Notes and Exhibits.

Monday, 8 December—

GROUP MEETINGS

(8 p.m. at National Hebarium unless otherwise stated)

Thursday, 13 November—Botany Group Meeting.

Wednesday, 18 November—Microscopical Group Meeting.

Friday, 28 November—Hawthorn Junior F.N.C. Meeting in Hawthorn Town Hall, at 8 p.m.

Monday, 1 December—Marine Biology and Entomology Group Meeting.

Wednesday, 3 December—Geology Group Meeting.

Thursday, 4 December—Mammal Survey Group Meeting in Fisheries and Wildlife Rooms, Flinders St. Extn., at 7.45 p.m.

Friday, 5 December—Preston Junior F.N.C. Meeting at 251 High St. (Rechabite Hall) Preston, at 8 p.m.

Friday, 12 December—Montmorency District Junior F.N.C. Meeting, at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, 16 November—Fraser National Park. Coach will leave Batman Avenue, at 9.30 a.m.; fare $2.00. Bring two meals.

Sunday, 7 December—Point Lonsdale. Marine Biology and general study. Coach will leave Batman Avenue, at 9.30 a.m.; fare $1.80. Bring two meals.

Friday, 26 December to Sunday, 4 January—Mt. Beauty with day excursions to Bogong High Plains, Mt. Hotham and other places of interest. Accommodation has been booked for the coach party at Mt. Beauty Chalet at $6.00 D.B.B. per person per day, individual payment. Coach fare (inc. day trips) is $20.00, and this should be paid to the Excursion Sec. by November General Meeting. Cheques should be made out to Excursion Trust. Picnic lunches available at a cost of 50 cents.

Excursion Secretary—Miss M. Allender.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: P. Gahan

F.N.C.V.

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Even the sundew, when in flower, takes on a glory in excess of Solomon. The photograph of the Scented Sundew (*Drosera whittakeri*) was taken by the Editor at Kiata.

Resin bored by Martesia striata Linne, from the Coast of Victoria

By ALFRED A. BAKER*

(Illustrations by Author)

A specimen of a resinous substance, found on the beach two miles east of Ocean Grove, Victoria, during the early part of 1965 by Miss Linda Stewart, had a large number of circular holes bored in it, and in a few of them the white paired valves of a boring mollusc remained.

The specimen, somewhat oval in shape (fig. 1) measured 4 x 3⅝ x 2 inches. It had an air weight of 209 grams and a specific gravity of 0.93; a colour range of from pale yellowish-brown to dark-brown, and a distinctive waxy lustre with sub-conchoidal fracture, translucent in thin section. Numerous small bubbles occur in the lighter coloured portions, and a section through the centre lengthwise revealed prominent flow lines. In the warmth of the hand, the specimen developed a slight tackiness.

A solubility test showed it as insoluble in ether and alcohol, but soluble in benzol, carbon tetrachloride and carbon bisulphide. In a flame test, the substance ignited immediately, emitting a small amount of fumes of a strong, persistant aromatic odour.

Comparisons were made with somewhat similar substances as—coastal bitumen from Portland, Victoria; coorongite from The Coorong, South Australia; ozocerite from Boreslaw, Galicia; asphaltum from Trinadad; fossil resin from Yallourn, Victoria; amberite (fossil kauri gum) from New Zealand; succinite (amber) from the Baltic Coast; commercial pine tree resin; and as a prepared substance—incense, as used during religious ceremonies.

Although each had their own characteristics; incense, which is prepared from various aromatic resins and barks blended by different formulas was the nearest in appearance, and had a similar distinctive aromatic odour. It was therefore, concluded that this bored material was of that substance. As incense is prepared in the Orient and other tropical regions, it could have been carried by sea travellers, lost overboard in Bass Strait and ultimately stranded on the beach after being attacked by the boring mollusc.

Approximately 70 borings occurred on the surface of the oval specimen, some being only shallow, probably due to marine currents interrupting the boring process. The mature borings measured 3mm. in diameter on the surface, to 4.5mm. at the widest diameter inside, the depth being 5mm. Nine borings contained remains of valves, most of which were damaged. One complete pair of valves extracted from its boring enabled identification.

Description of the shell

The valves, pear-shaped in outline, measure 5mm. in length; 4mm. in height; white outside with a white glazed surface inside. A groove (sulcus) slightly diagonal from the ventral to the dorsal edges of both valves divides each into an anterior portion

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of denticulated concentric ridges and a posterior of smooth concentric ridges (fig. 2A.). In the umbonal region the denticulated ridges form funnel-shaped pits (fig. 2B.), and a sickle-shaped flange extends over the umbo. A smooth callum almost encloses the pedal gape (fig. 2C.) indicating that the boring process by the animal had ceased. A shrivelled siphonoplax protruded from the posterior.

This description agrees with *Martesia striata* Linne (Turner 1955); excepting, although mature, the borers are diminutive, probably due to the nature of the material bored and its movement by marine currents. *Martesia striata* located in timber piles in the port of Sydney attained a length of 1½ inches (Johnston & McNeil 1941).

During the boring process by Martesia, waste material is ejected by a jet of water, therefore the animal does not absorb toxic substances which may be contained in the resin; whereas the Toredo (Shipworm) digests the material through which it travels.

Boring by marine animals into resinous material is unique; the Pholadidae usually bore into mudstone, limestone, coral, thick-shelled mollusca and wood. However, Sowerby (1849) describes *Martesia teredinaeformis* ". . . in cake of floating wax off Cuba . . ."; and Buckland (1879) writes—

Fig. 1. Resin showing borer holes. Scale in inches.

Fig. 2.

A. Right valve, showing mesoplax, anterior denticulated ridges and posterior smooth concentric ribs.

B. Anterior view, showing callum, denticulated ridges, funnel-shaped pits and mesoplax.

C. Ventral view of the two valves, showing callum, denticulated ridges, concentric ribs and the gape.

". . . in Mr. Cumming's collection there is a group of Pholads living in wax . . .",

then continues—

". . . Mr. Woodward also showed me a lump of gum from Australia (probably floated down some river into the sea) also bored by a Pholas".

Woodward (1910) refers to probably the same specimen with—

"*Martesia australis* in (fossil?) resin, on the coast of Australia".

To bring occurrences more recent; wharf piles of Turpentine (*Syncarpia laurifolia*) which, for a number of years were considered resistant to marine borer attack (probably on account of the oleo-resin layer of the inner bark of the tree) (Boas 1947), were found to have been seriously bored by *Martesia striata* causing disastrous results in the Port of Sydney (Johnson & McNeil, 1941).

This occurrence from Ocean Grove appears to be the first described record of Pholas boring into a wholly resinous material, and probably the first note of *Martesia striata* occurring more southerly in Australian waters than Sydney, N.S.W. (Hedley 1901).

Portion of the specimen is housed in the Melbourne University Geology Department collections. Reg. No. 3891.

Acknowledgments

To Miss Linda Stewart, whom I wish to thank for allowing investigations of the specimen; to Mr. V. Biskupsky, Geo-chemist, Geology Dept. University of Melbourne, for geo-chemical assistance in determining the resin; and to Dr. Ruth D. Turner, Museum of Comparative Zoology, Harvard University, Cambridge, U.S.A., for confirmation of the boring species.

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Some Thoughts on Sperm Whale Head

By VICTOR JACOBS

Some weeks ago when some friends mentioned that they had a block of land at Loch Sport we made an arrangement to spend the Easter of 1969 with them.

At home I took out the R.A.C.V. Gippsland Lakes map to locate Loch Sport. The Lakes National Park was there and so was Lett's Beach. The formed road became a bush track and ended at the entrance to the National Park. Our friend's later map and their information brought us up to date. Some eight years ago, a massive subdivision took place on the narrow isthmus that separates Lake Victoria and Lake Reeve. This piece of land was originally called Sperm Whale Head, and it is a pity that lack of imagination allowed the subdivided area to be named Loch Sport, for although there is plenty of modern sport there, the lakes are quite unlike lochs. From a natural history point of view the area is certainly better than the name would indicate.

The actual Lakes National Park occupies 5,500 acres and the new sub-division reaches to its western boundary. Not only housing development has altered the area—oil fields lie to the south. The Woodside rig is visible on the southern horizon from the high dunes that fringe the Ninety Mile Beach in the vicinity. A bitumen road leads to within six miles of the Loch Sport township and was constructed for the convenience of the oil and gas pipeline contractors. It now makes the approach to the area much easier. A causeway constructed across Lake Reeve for similar commercial purposes allows the car traveller to reach the top of the dunes overlooking this extensive and magnificent beach. A further causeway at the township itself is projected and will make the beach even more available.

Armed with these facts we set out with the van to travel the 160 miles to Sperm Whale Head, wondering whether the present ease of access to

Mahogany Gums growing alongside one of the tracks in the National Park.

Photo: Author.

one of the previously most inaccessible parks would have damaged it and to what degree.

Leaving rather late on Thursday evening we parked, after midnight, at Dutson Downs; and next morning, sighting some timber to the north, I set off along an easement. This area is used for sewage disposal, which is quite evident from the many shallow channels visible; as well as attendant odours. In the open areas flocks of Yellow-tailed Thornbills and White-faced Chats were seen. The former took refuge in the odd trees as I approached, while the Chats moved ahead as I walked. They rested on the fences when I stopped. I also noted a Brown Hawk, Willy Wagtails, Welcome Swallows and a group of Magpies.

The wood was separated from the flats by a fence; and I passed through it into what was an extremely "cosy" area. The cosiness was partly caused by the warm sun and the windless day, but also the combination of open spaces bedecked with succulent salicornias and ground covering composites, these being enclosed by eucalypts, tea trees and wattles. Three Red Wattlebirds fled while a couple of curious Grey Fantails came near. A Grey Thrush called fluidly as I returned to breakfast. (After reading Ellen Lyndon's "A Day Tour to Dutson" in the *Victorian Naturalist* for May, 1969, I realised that there was far more in this area than met my eye.)

We reached our friend's block before midday, and left three days later at approximately the same hour. This limited time is nowhere near enough time for an extensive survey of this area, and I am not qualified to make such a survey, but with the warm sunny days, and pleasant nights, it was possible to gather some impressions which may tempt some of our readers to visit the area for themselves.

The Vegetation

Ewart's flora refers to *Thryptomene miquelliana* as being confined to Sperm Whale Head, and I expected to have to search for it; but as I stepped from the car I was amidst masses of it. Many of the blocks have had a chain cleared at the front, and when regeneration occurred, a massive growth of this species took place and is still occurring. Plants of many sizes have thickly covered these treeless

strips, ranging from two inches to two feet in height. The specific name of this thryptomene has reverted to that of *T. micrantha,* the Tasmanian endemic with which it is conspecific. In the National Park the thryptomene is common and some pure stands are six feet high and very dense. One soon came to appreciate that "confined" does not necessarily mean rare.

One or two of the owners of established blocks have succeeded in "ridding" themselves of the thryptomene, and the buildings now stand on green carpets of lawn, broken only by the rose, geranium or other exotic shrub. It is a ghastly thought to imagine the whole subdivision being denuded in this fashion. At the present juncture these open grassy plots do serve a useful purpose; as several magpies use them as feeding areas. Magpies and their companion Mudlarks seem to prefer this open habitat. Indeed from observations at Narre Warren North, these open spaces are essential for their existence. There, after a vacation, when the grass has had an opportunity of reaching a height of about a foot, the magpies and mudlarks are absent. As soon as the mowing is complete, they return for a trio of reasons—the flat area with its excellent visibility gives a freedom from sudden attack by predators that may lurk in dense herbage; there is renewed access to their subterranean food; and there is an ample supply of chopped and minced meal supplied by the spinning blades.

Three banksias are common here—*Banksia serrata* (the Saw Banksia, of which there are some huge specimens on the higher ridges of the subdivision and many in the national park); *Banksia integrifolia* (the Coast Banksia, which is not so common but still general throughout the area); and *Banksia marginata* (the Silver Banksia). The latter is the least abundant of the three, but by no means rare. The latter two had a number of flowering spikes to the delight of the birds.

Leptospermum laevigatum (Coastal Tea Tree) was common over the whole area as a slender tree up to 40 feet high, and is also regenerating very well. The low growing *L. micromyrtus* was seen on a walking track that led north from the southern arm of the car track that follows Lake Reeve to the head.

The Mahogany Gum grows natu-

Banksia integrifolia (Coast Banksia) in flower.

Photo: Author

rally in the park. The trees seen ranged from small slender saplings to mature adults. This range of size was also noted with the River Red Gum and the Manna Gums. The alternative common name for the latter is Ribbon Gum, but this name does not suit the local population as the bark does not hang from the branches in the usual ribbon-like manner. Along the small walking track mentioned earlier, a number of eucalypts were noted with a definite mallee appearance (possibly peppermints). Along this track variable Bossea Pine Heath, and Prickly Broom-heath were seen in flower frequently.

On the shores of both Lake Reeve and Lake Victoria many halophytes were present. I recognised New Zealand Spinach (*Tetragonia tetragoiodes*) and Seaberry Saltbush (*Rhagodia baccata*). There were many other chenopods. Here too the ripe plumes of patches of Common Reed brightened the day with their golden bronze.

In amongst the dunes of the Ninety Mile Beach were patches of Marram Grass, Climbing Lignum (although creeping here), Knobby Clubrush, Cushion Bush and large dense bushes of an Olearia.

The northern shores of Lake Reeve, which apparently are subjected often to inundation, have ranks of red and green salicornias marching along these mud flats.

Some of the most interesting vegetation studies were not so much in the park itself, but on the subdivision. Mention has already been made of the rapid regeneration which has occurred on account of the removal of the shade-giving tea trees. On the low lying blocks, where eventually the concrete kerbing will form a firm bed for parking vehicles, was a veritable seed bed of native plants. These unfortunately are doomed; for even if the concrete is not poured for years, the rolling rubber wheels of "progress" will crush them. Some however have been rescued from that fate. I recognized among them, seedling eucalypts, thryptomene, a species of dodonaea, leptospermums, Running Postman, Spike and Hop Acacias, Pine Heath and Austral Indigo. There were many that I did not know.

Fauna

Kangaroos — The species found here is the Great Grey Forester, and large numbers of them graze at the eastern end of Sperm Whale Head. I only saw solitary animals, but quite frequently. The first one that we saw gave a great leap, and disappeared, presumably halting a short distance on. When I moved slowly after it, expecting to see it again at that point, it bounced up again, a further 50 yards ahead. It then disappeared again. It must have scuttled for that fifty yards with its head below the surface of the vegetation. This popping-up leap for a quick look-see, followed by the hunched scuttling action seemed to be the regular pattern of behaviour of these kangaroos when disturbed. This was proved on subsequent occasions. If I happened to be looking in the correct direction, I would see the first bounce, but after that no more sight of kangaroo. If my gaze was turned away when I heard the first thudding crashing noises I would have no glimpse at all of the animal. One, which I disturbed, must have been snoozing beside the track, for as well as the first high periscoping bound I was able, in the thinner bush, to watch the hunched posture as it hurried away.

Wattle-birds—Both Red and Little Wattle-birds heard and seen over the whole area frequently, but especially where the banksias were in flower.

Grey Butcher-bird—Not sighted in spite of searching, but heard each dawn singing gloriously close by our camp site.

Rufous Fantail—The call was heard distinctly and the birds briefly sighted in thick scrub. Part of this identification is based on the shyness of the bird, for if they had been Grey Fantails, they probably would have remained longer at that spot, or even allowed an approach.

White-browed Scrub-wren — This species made itself known on a side track in the park, and the effect of its scolding was to attract other small birds. These were an Eastern Spinebill, a White-eared Honeyeater, Brown Thornbills and a Grey Thrush. They made their fleeting inspections and moved on. Next morning, not one hundred yards from an occupied residential block, I saw a much tamer Scrub-wren working its way along a tree branch quite in the open, and not diving for cover as I moved very near.

Yellow-winged Honeyeater — Occasional sightings.

Mudlarks—One family was seen in the cleared area at the end of the Head.

Yellow-faced Honeyeater—One pair noted playing chasey and insect hunting in the outer foliage of eucalpts.

Bronzewing Pigeons—Seen on a few occasions when disturbed while driving. They flew from the track and were easy to observe as they perched nearby.

Grey Currawongs—Seen and heard throughout the area.

Blue Wrens—They were common in the scrubby places, although very few males in full plumage were seen.

Black Swans—These were particularly abundant on the shallow western extremity of Lake Reeve, and seen in two's and three's elsewhere on open water. Frequently at dawn and dusk pairs flew across the narrow stretch of land. In these large flocks of swans were lesser numbers of Pelicans and Hardhead Ducks. Here too were numbers of Pied Cormorants flying directly or perched immobile, as well as a number of erratic flying, fishing Crested Terns.

Just as with the land birds which exhibit a certain gregariousness between species, so it was on the shore. At one spot on Lake Victoria I saw four Black Swans, two Spur-winged Plovers, half a dozen Silver Gulls and one White-faced Heron within a few yards of each other. It was possibly the feeding opportunities that brought them so close together. As I left the small group a movement above caught my eye. A pair of White-breasted Sea Eagles sailed gracefully towards the far side of Lake Victoria.

Rosellas—Crimson and Eastern Rosellas were quite common.

Kookaburras—Heard and seen infrequently.

Cockatoos—A flock of six or seven yellow-tailed Black Cockatoos was seen working through the tree-tops in thick tree cover in the park.

Dotterels — Many small dotterels were seen feeding on the far side of Lake Reeve, but even with binoculars it was impossible to identify them. As I moved along the shore to approach them a group of ten White-faced Herons left off feeding and flew to perch in a straggly banksia. A second banksia close beside had a flock of feeding Wattle-birds, and when a White-eared Honeyeater attempted to dine at the same "table", he met a hostile reception and quickly retreated.

Black-faced Cuckoo-shrike — One pair alone was seen at the edge of a

dried lagoon near the end of the heads.

Australian Ravens?—The few seen were on the wing and specific identification not possible.

Spiders

It was impossible not to be aware of Orb Weavers as their webs were the largest that I have seen. In almost every suitable position they were spun, blocking most apparent open spaces between trees. One wide track was spanned by the largest of them all, the main line being all of eighteen feet long. Another, a little shorter, blocked the way out for our car each morning on our friends' block, and it was with reluctance that we drove through the large well constructed orb. We were glad to see that although the vertical line snapped, the main horizontal line stood firm.

On our last evening I kept watch, and was able to see the large spider come down to attach its vertical thread to a small twig. I noted the time, and just an hour later the web was complete. This latter inspection was made by torchlight. The spider had already wrapped up an insect caught that evening, and when the beam of the spotlight attracted a moth into the web he rushed at it and soon wrapped this in a silken parcel too. After the first two slow turns to swathe it in silk, he held the partly wrapped bundle by the ends with two legs, and with others spun it like a bobbin on a spindle and quickly finished the parcelling. The moth's eyes gleamed like gems each time they came into the torchlight. The short time we watched was however too long for two more moths, who also followed the beam into the web. Feeling we had given enough assistance to the spider, we left her well stocked but still adorning the centre of the orb.

A few interesting hours were filled the next morning, and then we were on our way home, refreshed, and intending to return, hoping that the nature of this unusual and enchanting area would not suffer too much from progress and development.

Acknowledgements

To Mr. Court of the National Herbarium for plant identifications, and to Mr. Cook, the Ranger at the National Park for general and specific information.

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Unique Aboriginal Flint Implement from Cope Cope, Victoria

By ALDO MASSOLA*

The unique flint implement here described, and which for convenience will be called "the Cope Cope implement", was found by Mr. Sam Grewar in about 1960 while ploughing one of his father's paddocks, about half a mile from the Grewar's Homestead near Cope Cope, a township about six miles south of Donald, in west central Victoria.

The country around Cope Cope is low-lying, and characterised by the presence of several lakes, both large and small, and salt and freshwater, which drain the surrounding country. One of these depressions is called Lake Cope Cope, or Brown's Lake, and it may be said to be the end of this local drainage system: perhaps it is situated a little higher than the others, but whatever the reason, it only fills with the overflow from the other lakes.

The name "Cope Cope" is descriptive of this fact. According to Brough Smyth's *The Aborigines of Victoria* an aboriginal defined the meaning of the word as follows:

> "You take one big fellow bottle, and two, three, little fellow bottle. You put water out of little fellow in big fellow bottle. Then big fellow all the same Cope Cope".

The Grewar's Homestead is built on a ridge running east and west just south of this lake system, and this ridge is a logical place for an aboriginal camp, it being not far from semi-permanent water, and yet above flood level; and from it a good view can be had of the surrounding country. However, no sign of a camp is discernible now. Years of ploughing and fallowing have effectively turned the soil over, and any camp debris or small implements that may have been there have been ploughed under. A campsite must have existed, nevertheless, because the Grewars have a number of millstones, hammerstones, axes, and anvils, all made from the usual diabase, quartz, and quartzite, as well as a large nosed-scraper made from the same variety of flint as the implement now under discussion. These were all picked up during ploughing operations on, or in the vicinity of, the one paddock.

The Cope Cope implement was accidentally broken in two by Mr. Grewar, but the two halves were neatly glued together, so that it is complete. It may be described as a large flint flake, 6¼ in. in length, and 5¾ in. in width, square at one end, and rounded at the other. The square end has a maximum thickness of 1 in., increasing at the centre of the flake to about 1¼ in., and reducing to a natural sharp edge on the rounded end and on one side of the flake. The bulb of percussion formed one of the two corners of the square end, but most of it was trimmed off. Although the rounded end is sharp, it does not appear to have been used, the few indentations around its periphery being probably accidental. Some of the cortex adheres to one of the faces of the implement, and this face has been subjected to considerable chipping, in order to produce a symmetrical, blunt, pick-like point on the second of the two corners of the thick square end (the first being

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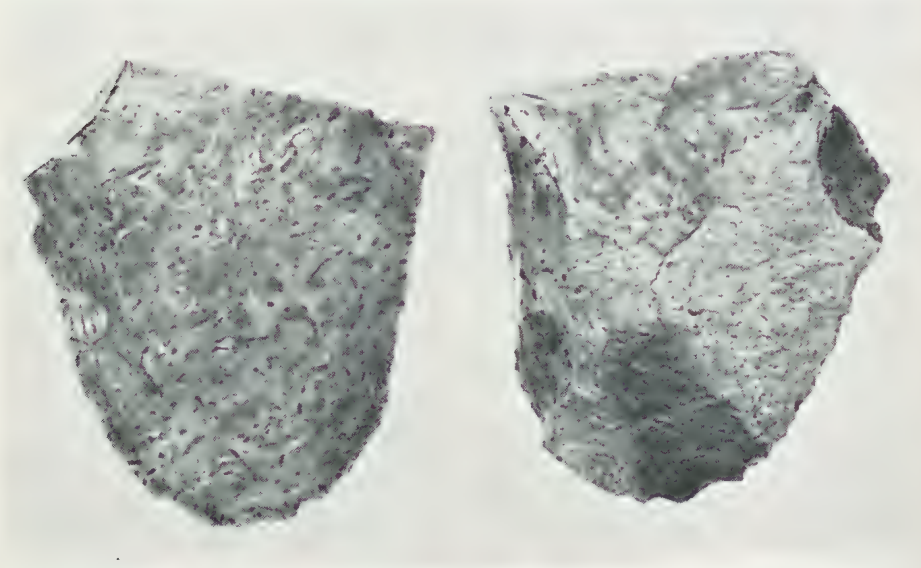
the striking platform with the remains of the bulb of percussion).

The other face shows no sign of retouch, and is as when first struck off the matrix. The implement is therefore a uniface symmetrical-sided pick. As far as I know, no similar artifact has ever been described.

The material of the Cope Cope implement (and of the nosed-scraper above mentioned) is a grey fossiliferous flint, heavily mottled with dark blue-grey, and has a high gloss, the latter probably produced by exposure. A third implement of the same material, a small side scraper, was found by Mr. Ron Falla, of Litchfield, and myself, on a small campsite on Sammy's Lake, about 24 miles north-east from Lake Cope Cope. The material of these three implements is strongly reminiscent of the flint found in the Cretaceous chalk of England.

Being so alike in colour to the English flint, and since most south-eastern Australian flint implements known to me are from unmottled material, my first impression was that these implements had been made from flint-ballast jettisoned from early sailing ships at some places along the Australian coast, such as at Mud Island, at the mouth of the Yarra River, in Melbourne; and at Kirton Point, Port Lincoln, South Australia.

However, comparisons with samples from these dumps proved my hypothesis to be incorrect; but no similar flint was found in any of the Melbourne and Adelaide public and private collections examined by me. The Cope Cope implement was therefore submitted to Dr. K. Abele, Palaeontologist at the Mines Department, in Melbourne, in the hope that his identification of the fossils imbedded both in the flint and in the cortex could be of use in determining the provenance. He pronounced them as being fragments of bryozoa, fossils abundant in limestones and marls of Tertiary Age in south-east Australia.



The Cope Cope implement showing both faces; the right hand photograph showing chipped or retouched face.

Photo: Author

It would thus appear that the flint is from an unrecorded deposit, which could be anywhere, even along the ridge overlooking Lake Cope Cope, and probably small enough to escape the attention of the locals, but not of the observant aborigines.

Such a "lost" native flint quarry exists on the southern slopes of a ridge close to the banks of the Murray River, between Spring Cart Gully and Calperum, downstream from Renmark, in South Australia. I had seen it some years ago, and chancing to be in the vicinity subsequent to Dr. Abele's identification of the fossils, this deposit was re-examined by me.

It is indicated by a large quantity of broken pieces and chips covering an area of about 300 feet by 50 feet, and the flint is honey-coloured, strongly mottled with dark brown, not unlike the flint found on Danish kitchen middens. Although it is not of the same colour as the material of the Cope Cope implement, it shows that mottled flint does occur in the south-east, and in such unlikely places as the stoneless country of the Murray River bend.

As far as the use of the Cope Cope implement, I can offer no suggestion, nor could Mr. H. M. Cooper or Mr. N. B. Tindale, the well-known South Australian Museum authorities on stone implements, with whom it was discussed. However, Mr. Tindale, did suggest that, in use, the implement must have been held with both hands gripping the fortuitous cutting edge, and that they would have been protected from being cut by a covering of bark or of gum placed over the edge, as he has seen done by recent aborigines in Northern Australia.

Acknowledgments

My thanks are due to Mr. and Mrs. Brian Grewar, for allowing me the freedom of their collection; to Dr. Abele for his identification of the fossils; and to Mr. Cooper and Dr. Tindale for examining the implement and for their useful comments.

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F.N.C.V. Excursion to Trentham Falls and Blackwood

17 August, 1969

By ELIZABETH K. TURNER

The ambient temperature was about 54°F but there was plenty of sunshine and no wind, as a bus load of 35 Melbourne members and several car loads, headed N.E. towards Bacchus Marsh; our leader being Bruce Fuhrer.

At the top of Anthony's cutting we turned north through typical Mallee country on the Coimadai road. A walk was made along the roadside where the Bull Mallee, (*Eucalyptus behriana*) and the Moonah (*Melaleuca pubescens*) flourished. *Myoporum deserti,* the Turkey-Bush was in full, honey-scented flower, and we noted the salt-bushes, *Rhagodia parabolica, R. nutans,* and *R. enchylaena,* the Barrier Saltbush with short, greyish, cylindrical leaves.

There was also "Common" *Cassinia aculeata* (Dogwood), *Eutaxia microphylla,* and many flowers of *Clematis microphylla* forming tangled mats over the shrubs.

At Coimadai we noted the yellow gum, *E. leucoxylon.* We joined the Bacchus Marsh-Gisborne road north along the "lava residual" formed by the ancient southward flow of lava from Mount Bullengarook. On the east side there is a steep slope down to the Coimadai Creek, and on the west to Goodmans Creek, and beyond this the tree-clothed Blackwood Range and Lerderderg gorge.

Here we saw dead gum trees festooned with white Sulphur-Crested Cockatoos, giving the appearance of magnolia trees, and a wedge-tailed eagle being attacked by both a raven and a magpie. *Acacia pycnantha* (Golden Wattle) was in flower in the dry, stony ground.

Mt. Bullengarook, 2207 ft. was almost denuded of trees, but Mt. Blackwood, 2415 ft. is still clothed with vegetation.

At Gisborne we joined the Calder Highway to Woodend and then turned north-west again, through Tylden, noting Snow Gums (*E. pauciflora*) along the roadside, to Trentham Falls where the Coliban river has undercut a Tertiary lava flow which falls away along the vertical joint plains, rather like wavy "organ pipes".

Here we joined with three bus loads (122 members) of the Geelong Field Naturalists Club, led by Mr. Jack Wheeler, their President. Barbecue lunch was enjoyed in the sunshine, over-looking the falls, and then on a walk to the foot of the falls we found the Blanket Fern (*Pleurosaurus rutifolius*) and the necklace fern (*Asplenium flabellifolium*).

At the top of the falls we found *Todea barbara,* the Austral King-fern.

A koala was sighted feeding in a tall, broad-leaved peppermint (*E. dives*), and amongst the birds at this spot we listed:—

Galahs, Goldfinches, Grey Thrush, Blue Wrens (with some immature specimens), Yellow-tailed Thornbills, Brown Thornbills, Grey Currawongs, various Honeyeaters, White-browed Scrub Wren, Crimson Rosellas, White-throated Tree Creeper, Flame Robins, and Kookaburra.

Acacia mucronata (Narrow-leafed Wattle), and *Acacia verniciflua* (Varnish Wattle, Bacchus Marsh variety), were seen in flower here.

The combined Geelong and Melbourne parties then went on across the Lerderderg river into Blackwood, where we tasted the mineral water issuing from a spring in the rock face. Here, the main vegetation of the forest is Candlebark (*E. rubida*), Messmate (*E. obliqua*), and broad and narrow-leafed peppermint (*E. radiata*). Blackwoods and other Acacias were quite common, and many tall Greenhood Orchids (*Pterostylis longifolia*) were found in flower.

A Golden Whistler was heard, and a Spotted Pardalote was both heard and observed here, as were an unpleasant-looking mass of lively Gum Saw-fly larvae on a young gum sapling. Here, we collected *Pultenea gunii* (Golden Bush Pea) and *Pultenea daphnoides* (Large-leaf Bush Pea), both not in flower.

Acacia aculeatissima, the thin-leaved scrambling wattle, was in flower, also *Pimelea axiflora* (the tough or Bootlace Pimelea).

Pink and white heath (*Epacris impressa*) was in abundance on the hillside which we ascended to Shaw's Lake and the Lookout. We departed from Blackwood and travelled via Myrniong on to the Ballarat road and returned to Melbourne as darkness fell.

Lestis bombilans

By A. J. SWABY

In Spring 1938, our late member, Harold Smith, his son-in-law Gordon Fraser, and I camped in the Black Range, Grampians. Coming back to the truck ahead of the others, I noticed a perfectly round hole in the dead flowerstalk of a grasstree and half an inch across.

It reminded me of a flute. I broke it off and blew. Vigorous buzzing shook the stalk.

I broke it open and seven large bees appeared, apparently not yet active after winter. Very beautiful they were, shining green with golden bristles on the legs.

We sent a specimen to our late Tarlton Rayment. He recognised them and asked us to find the food plant. We later saw several in flight, but only one stopped, on Nodding Bluelily, and that for no food.

McKeown records them in Blue Mountains and suggests the grasstrees as the probable source of food. In that year, although we explored widely, no grasstrees flowered.

We found a few more nesting in the stalks, all in Black Range. They have been reported west of Victoria Range.

Many of these problems await the attention of observers living in the bush, if only we can enlist their aid.

Rediscovery of Calochilus richae

By DAVID JONES

This orchid which had been lost to science for forty years was rediscovered again last season by a pair of orchid enthusiasts. *Calochilus richae*, one of the State's rarest and most remarkable orchids, was first noticed by Mrs. Edith Rich of Rushworth. A keen orchid collector with many notable local finds to her credit, she sent three specimens in a batch of orchids to W. H. Nicholls in October, 1928. He at once recognized its distinctness from all other species and named it in honour of the finder. The locality was given as approximately five miles south of Rushworth. The orchid was not sighted again for a further forty seasons although many hunted for it. In its absence theories were put forward that it was nothing more than a teratological mutant, or an infertile freak which had turned up out of the blue. Some wondered if the species had been lost in one of the many loads of gravel that have been, and still are being taken from that area, and spread over surrounding roads.

The answer was supplied on Sunday, 27 October, 1968, when John Jamison, a keen local naturalist, was out looking for suitable orchids to capture on movie film. He had discovered a patch of Beard-orchid leaves earlier in the year, and upon revisiting the area later with his wife, noted that quite a few were different from the normal and the first of the type he had seen. He collected a specimen and took it for identification

Photo: E. Rotherham

to Ken King the local authority on the Rushworth area. Ken, who had been hunting for the same orchid for many years, recognized it at once and realized the importance of the find to Australian orchidology. Ken had aptly described the labellum over the phone to Mr. Ted Rotherham, as "resembling a spike roller". The author was Ted's self-invited companion on a hurried trip up to Rushworth on the day following the find. John Jamison, the rediscoverer, had kindly made a trip over from Kyabram to show us the exact locality.

A quick, close scrutiny of a collected specimen under the lens showed that the orchid was indeed *C. richae*, unique because of the short spikes and hooks scattered on the upper surface of the labellum, and the curious channelled, entire tip of the same organ.

At the site John soon picked up a solitary individual, but it was half an hour before the main colony was found only about one hundred yards further on. Twelve plants were scattered amongst the fallen leaf litter of the Red Ironbarks, the dominant eucalypt in the forest. The plants were confined to a small area and an extended search of the surrounding hill failed to reveal further specimens. They varied from dwarfs with solitary flowers up to more robust plants, about 36 cm. high, bearing up to five flowers in various stages of development. Many had obvious and well developed seed capsules indicating at least that the species was fertile. The plants appeared to be in good condition and from Ken's remarks it was apparent that the area was enjoying a bountiful season. The species was located about half way down a gentle slope facing south, and growing in a shallow stony skeletal Ordivician soil so typical of much of the area. Other orchids were quite common, especially

Photo: E. Rotherham

Calochilus robertsonii; each time this was noted a hasty examination was made to ensure that it was not actually *C. richae*, although the two are not easily confused, once seen. *Caladenia dilatata, C. angustata, Thelymitra aristata, T. rubra* and *Microtis unifolia* were also scattered through the area. No *Calochilus imberbis* were seen and they did not appear to be in the immediate vicinity. This is of interest because among the original collection of orchids sent to W. H. Nicholls, were specimens of *C. imberbis*. However the information available does not indicate that the two species were actually growing together, and they may have been collected from different localities on the same day. Immediately up the slope from the orchids was a belt of green flowered *Grevillea alpina* and blackboys (*Xanthorrhoea australis*) many of which had magnificent spikes towering in the air. Other plants common to the area

were *Brachyloma daphnoides, Cheiranthera linearis, Cassinia arcuata,* and scattered tussocks of wallaby grass (*Danthonia* sp.).

The weather was cool and muggy when we first arrived at the locality, and it was quite noticeable that the sun-orchids were not at their beautiful best. As well, the first specimens of *Calochilus* seen were only partly open, the lateral petals still being crossed in front of the column. Within an hour the sun broke through the clouds and the temperature quickly rose. The *Thelymitras* opened wide in response to this and as well, the *Calochilus* flared their petals, lowered their labella like drawbridges, and soaked up its warming rays. As *Calochilus* flowers normally only last 1-2 days this behaviour in relation to the sun is most interesting. The same phenomenon is particularly noticeable in another member of the genus, *C. imberbis,* which is at its best on a warm sunny day.

Calochilus richae is a unique member of a very interesting genus. It is quite probable that the colony described is the original type locality and the orchid is not represented anywhere else.

It is certainly rare as forty years have passed since the first sighting and many people have combed the Rushworth forest in the intervening period. As the colony is so small, a slight miscalculation on man's part could erase it from the earth's surface forever. In addition to *Calochilus richae* the particular locality abounds with other oddities. A completely bald *Calochilus* distinct from *C. imberbis* is scattered throughout as well as a spotted form of *Thelymitra aristata* and a magnificent form of *Calochilus robertsonii* with a deep reddish black labellum, column and lateral petals. Such a fascinating area should be set aside so that the future of these orchids is assured and coming generations of orchidologists can see them growing in situ, and appreciate them in the natural state, rather than from herbarium specimens.

Already the indiscriminate gravel quarrying which goes on in the area poses a very real threat to the survival of these plants. Having visited the site, one feels compelled to register the strongest possible plea for its future safety and the conservation of the species. It is sincerely hoped that some responsible authority will consider the area worthwhile preserving and carry out the appropriate steps. The party feels that fencing the area would be inadequate, as such enclosures tend to attract attention to the plants. The species is obviously capable of existing in the natural environment, and its survival could be virtually assured if removal of gravel from the Rushworth State Forest was totally prohibited. It would indeed be tragic if these orchids were to be spread over the country's road surfaces. As one observer stated "It has taken the Rushworth forest one hundred years to recover from the effects of gold mining".

Don't let's turn back the clock now.

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Field Naturalists Club of Victoria

General Meeting
13 October, 1969

The President Mr. E. R. Allan was in the chair, and about two hundred members and friends were present.

Apologies were received from Mr. J. Baines; and per Mr. R. Taylor, from Mrs. G. Taylor, Miss Jean Blackburn, and Dr. M. Wanliss who are in Western Australia.

Miss Young reported that Mr. Vic Miller had now completely recovered from his accident, and that Mr. and Mrs. E. S. Hanks were in Townsville.

Mr. Allan announced that Mr. K. C. Halafoff died a few months ago. He is especially remembered for his interest in and writings on the lyre bird, published in the *Naturalist*. He analysed the music of the lyre bird with special competence. Members stood for a minute in silence as a tribute to his memory.

The minutes of the last meeting were taken as read on the motion of Mr. W. Woollard and Miss M. Butchart.

Twelve new members whose names appear in the October *Naturalist* were elected on the motion of Mr. A. J. Swaby and Mr. Morrison. Mr. R. Taylor reported on the "Save Our Bushland Action Committee" which has arranged a meeting in the Palais Picture Theatre for which leaflets advertising it were available. Leading Conservationists will prepare a charter for conservation, in which Mr. D. Lee, Dr. M. Calder of Melbourne University Botany School, and Dr. Moseley of the Australian Conservation Foundation will be assisting.

A message from the Editor asked members for more items for the *Naturalist*.

The subject for the evening was "Geology and Other Aspects of Flinders Island", by Mr. Keith Darragh, Palaeontologist at the National Museum of Victoria.

By a blackboard diagram and maps he explained the position and features of Flinders Island, and coloured slides gave a clear idea of the nature of many parts of the island—the largest of the Furneaux Group in eastern Bass Strait off the N.E. coast of Tasmania. The smaller ones of the group are Cape Barren, Clarke, Preservation Is. and others. The Group was named in 1776 after Tobias Furneaux who sailed on the east side of the group. Later a ship sailing to Port Jackson was wrecked at Preservation Is. and the sailors were rescued from there.

Matthew Flinders surveyed the Islands and made notes on natural history and geology, and the possibility that there was a strait which Bass and Flinders later proved. He sent the first Wombat to England in 1798 from Clarke Is. Now they are exterminated. Sealers were sent there because of reports, and a large colony of seals was nearly wiped out in about 20 years. Sealers settled on the island, burnt the vegetation and shot Kangaroos and other animals for food. Many small animals were exterminated. Apart from sealers, there were very few visitors to the Island. In 1831 there was an attempt to settle 200 remaining Tasmanian aborigines on Flinders Island.

Now there is only one building with convict made brick at that settlement, and a graveyard. The settlement was abandoned in 1847—the aborigines having mostly died. Only a few remaining were sent elsewhere.

In 1888 it was leased to various people and parts were thrown open for selection.

At the turn of the century an expedition of Victorian Field Naturalists visited Flinders Is., and were the first scientific people to look at it. After the 1918 war some soldiers were settled there. At the end of the 2nd World War the Bank of Tasmania assisted soldier settlement, and now there are 62 soldier settlers. The Government spent $12,000,000 in clearing, pasture development, trace elements, and making water holes.

The islands are mostly granitic as in Wilson's Promontory and north-east Tasmania, and they break Bass Strait into two—the Bass basin where no oil has been discovered, and the eastern section which shows oil. There is a regular air service between Launceston and Whitemark—the capital—or a party can charter an aircraft at Moorabbin. There are good roads and every locality is accessible by a short walk. There are two hire car services, and bicycles are used. The climate is equitable, the rainfall being 25-35 inches, and there are strong westerly winds. The island is 40 miles long, 15-25 miles across, and has an area of 513 sq. miles. It has a

granite backbone, a little to west of centre, the highest peak being Strzelecki Peak named in 1843. It is 2,500 ft. high and one and a half miles from shore.

There is a narrow coastal plain covered by two sets of dunes, old consolidated dune limestone, and a younger set of dunes a few thousand years old only, and not mobile, but could be if the grass cover is interfered with. The only mobile dunes are towards the north.

Fossil remains of marsupials and birds found are thought to be the remains of food bones, left by the aborigines, although the Tasmanian aborigines were not there until they were settled in 1831; so in earlier days there were other aborigines.

The oldest rocks form the original backbone of Silurian—Devonian sandstone and siltstones. No fossils have been found in it. Intrusions of granite alter the sandstone by heat.

One picture showed a dyke within the granite. Subsequent to the intrusion of the granite into the sediment, there was a long period of erosion, and then 40 or 50 million years ago there were basalts extruded from an unknown volcano about the time the older volcanic rocks were formed in Victoria, as in Royal Park railway cutting. Under the basalt are sediments with large pieces of wood which are not eucalypts.

After these basalts were extruded, Flinders Is. was probably submerged in late Tertiary times, 5 or 6 million years ago. Now shell beds of late Tertiary age are found. Dune lime stones are of Pleistocene period—probably of the same time as Barwon Heads.

Water is a problem but there is spring water and shelter near Trouser's Point. Strzelecki Peak is a scenic reserve with only one track. There are some attractive valleys. As soon as the creeks get down to the coastal plain the water disappears. There are lime stone caves, and in one of the gullies a limestone cave still has water percolating through with stalactites forming.

The capital—Whitemark—has a population of 150-200 and a hotel, butcher, store, two houses, and flats to hire. At low tide the water goes a long way out and is very shallow. The little "Flinders Islander" comes in to the jetty. There are new dunes near the water and consolidated dunes in the background, with limestone sink-holes, and swallow holes where a stream flows into underground caves.

There is an aerodrome at Pat's River —the only decent sized creek. There is a long runway for emergency landings, and it is one of the busiest in Tasmania with a regular service by Ansett. DC3's take out crayfish to Melbourne for processing—a big industry—and also meat.

Small aircraft come for fishing or for a holiday from Melbourne or Tasmania. One picture showed a stream with tree ferns in a sheltered valley. Low scrub, waist or shoulder high, makes it difficult to climb through. Eucalypts cut by the wind are dwarf, but in the valleys they may be 20-30 ft. high. Wallabies are in the high country, and are shot regularly for dog meat or sport.

About the central coast there is the Lady Barren Village with only one quarter of the population of Whitemark. It is the centre for the fishing fleet, in a sheltered position. C.S.I.R.O. have a bird banding project with mutton birds. The old islanders collect mutton birds but there is very little money return.

Sheep are carried by aircraft to other islands which are burnt off to promote grass growth.

One picture of Flinders Is. showed a sheer vertical face of granite with overhangs caused by sheets falling off. These are impossible to climb. There is a fauna reserve left in an uncleared wetter part. A valley almost N.W.-S.E. runs along joints in the granite, and along the course of the stream are tree ferns. The owner is a bird observer and intends to keep it uncleared.

Over the eastern coastal plain, granite peaks pop up above the plain as conical hills. Mr. Darragh went to Flinders Is. to collect fossils found on the east side. There is a lot of swamp and tea-tree, the latter being mostly cleared in 1952, but shelter belts have been left. Farmers complain that there are not enough belts, as it is very windy.

The soil is dark and peaty, and thin over the sand with marine fossil shells. The coastal plain has beautiful pastures supporting more sheep to the acre than in Victoria.

Cape Barren geese are plentiful and increasing. There are reserves for them on offshore islands, but unfortunately the birds see greener pastures on Flinders Is.., where farmers are alarmed, and would get rid of them.

One, or sometimes more dams are sunk in every paddock, with water 10-

12 ft. down. Some are only scooped out by a mobile crane with bucket on a caterpillar tractor. Water comes in from underneath. In the coarse sands scooped or dug out, there are great numbers of shells, some of late Tertiary of 12-15 million years ago, or in the northern part, 1-2 million years ago. Many of the shells are quite complete and perfect, with a lot of fragments showing a great variety. There are four periods of deposition.

Rocks of this age do not outcrop in Victoria and one cannot collect fossils out of a dam, so Flinders Is. is unique and important, as it is one of the few places where shells of this age can be collected.

A 1,700 ft. granite peak, Mt. Tanner in the north has two huge "dishes" on a tower—a communication link with Tasmania. In the 20's and 30's there was tin mining, but the lode was not found. Probably it was from a dyke eroded out and brought into the valleys. Now a Victorian company is drilling in a valley between the three Patriarchs Peaks and Mt. Tanner. With the tin, large, not very good Topaz stones are found, and rock hounds come to fossick. Cape Barren Is. is a granite bleak landscape. A picture showed granite with black dykes of five grain diorite. Franklin Village has a school, post office, and very few people. Children are taken to school in Launceston, and many do not want to come back to live. Only small boats go there, but Cessna aircraft can land on any of the islands. Beautiful beaches are a feature of the islands.

The President thanked Mr. Darragh for his interesting talk. Mr. Morrison projected the slides.

The Secretary announced he had received several publications: "Birds of Flinders Is.", "Man, the Earth and Tomorrow", Current Natural Resources Magazine, and Australian Museum National Photographic Index of Australian Birds. There is to be a competition to obtain slides of birds for the Australian Museum.

A letter from Mr. Myers of Rose Hill thanked the club for the appointment as our representative on the Lederderg Gorge Forest Park Committee.

Photoflora 1970 entries close 2 February, 1970. Forms can be obtained from Miss Betty Terrell, 24 Seymour Ave., Armadale.

A report from the Upper North East Field Naturalists Club was read.

A letter from K. Davis announced that the Mordialloc Council had abandoned the project to build the Marina, taking notice of the objections. Dr. A. Parkin requested aid from people with knowledge of botany to give wider experience to scouts in two excursions, one to Jumping Creek Rd., and the second to Mason's Falls on 2 November.

Exhibits

Mr. A. Morrison showed Graptolites from Enock's Point W., fruits of the Baobab tree (*Andansonia gregori*) with sweet pulp and black kidney shaped seeds. These are eaten by aborigines.

Woody pear—the fruits of *Xylomelum angustifolium* (W.A.), the big capsule of *Hakea platysperma* (*W.A.*) cut open showing the big flat winged seeds.

Mrs. North brought polished petrified wood from Oakey (Queensland), a tourist axe from Mt. Hagen, New Guinea, and an authentic axe, also a woven Buka basket from New Guinea.

Mr. Swaby showed a collection of garden grown Native plants.

Mr. McInnes showed living ostracods under the microscope. These are like the fossils in rock from Coimadai.

Mrs. North reported the activities of the Montmorency Juniors.

"Save our Bushland"

This is a record of the proceedings of the public meeting which was held in the Lower Melbourne Town Hall and Scots Church Hall, on Friday, 29 August, 1969.

It is available from F.N.C.V., or V.N.P.A. sales officers at a cost of 50 cents (plus 9c postage).

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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Ken G. Simpson photographed this young Southern Elephant Seal at Macquarie Island in 1965.
Photo by courtesy A.N.A.R.E.

Distribution and Polymorphism of *Tribulus terrestris sens. lat.* in Australia

V. R. SQUIRES*

Tribulus terrestris L., an almost cosmopolitan plant, is widespread in Australia. Australian populations of *T. terrestris* are believed to arise from two sources, an introduced form which is common in southern Australia and a native form common in central and northern Australia.

The species, as conceived in Australia, is polymorphic. This variation is reviewed in the light of cyto-taxonomic considerations. It is concluded that careful breeding experiments and cytological examination of a wide range of Australian material would throw light on the question of whether *T. terrestris* is one extremely variable species or whether at present several closely allied species are included under this name.

Introduction

Tribulus terrestris is a weed of cultivated fields, vineyards, recreation areas and waste places (roadsides, railway yards etc.). Its success as a weed depends on a high reproductive capacity, an effective means of seed dispersal and an ability to germinate rapidly under low moisture and thus gain many favourable micro-sites for seedling establishment (Squires 1969). Control measures are generally ineffective, unless repeated frequently, and are not usually attempted except in areas of intensive land use.

T. terrestris is believed to be native to Australia (Squires 1968) but in introduced forms occur in the southern, winter rainfall regions (Squires 1969). The earliest records of the introduced forms dates from the early 1900's (Anderson 1910). Since that time it has become well established on all but the heaviest textured soils of the major sheep/wheatbelt in southern Australia.

It is the purpose of this paper to assess the distribution and extent of polymorphism in the Australian populations of *T. terrestris*. The implications for weed control programmes are considered.

* CSIRO Division of Plant Industry, Riverina laboratory, Deniliquin, New South Wales.

Taxonomy and Cytogenetics

The genus *Tribulus* is in the family Zygophyllaceae and has been placed by Engler (1931) in the subtribe Tribulinae within the tribe Tribulae and the subfamily Zygophylloideae.

T. terrestris is the most widespread species in the subtribe even if native range alone is considered. Two subspecies subsp. *terrestris* Kern. and subsp. *orientalis* Kern. are sometimes recognised but they do not appear to have any discreet patterns of geographical distribution and are therefore best regarded as varieties (Tutin 1968). Other varieties are *occidentalis* Kern., and *typicus* Beck. The members of the genus are (with the exception of the African *T. excrucians* Wawra. herbaceous annuals or perennials. The genus is not a large one and has about 54 species (Phillips 1951) confined to the dry tropical and sub-tropical regions, chiefly Africa and Australia. There are 19 species in Australia including *T. terrestris*, of these 18 are indigenous (Willis 1962).

South African members of the genus are reasonably well understood as a result of the study by Schweickderdt (1937). His study also provided an introduction to the extensive synonymy which exists in the nomenclature of the genus. Schweickderdt lists

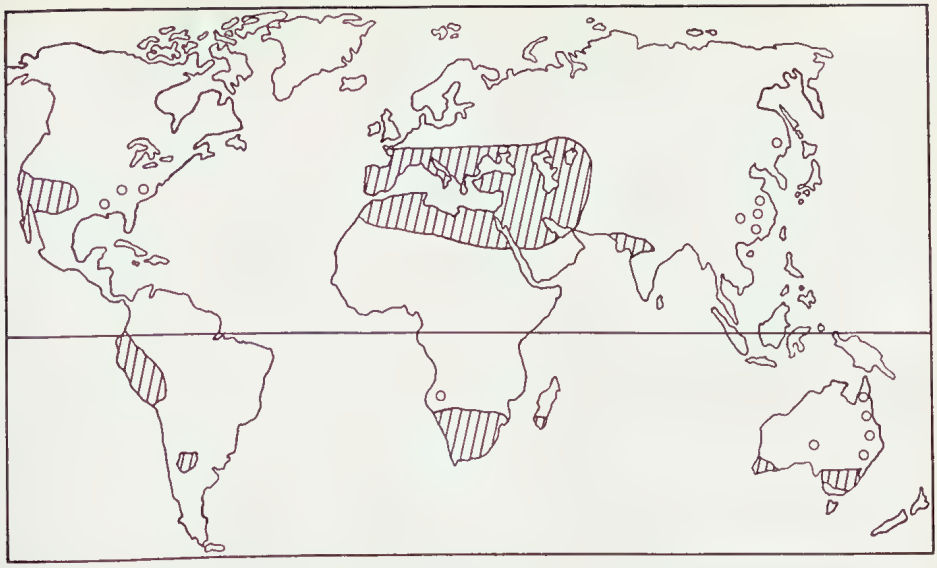

Figure 1—World distribution of *Tribulus terrestris* with outliers shown thus:— O.

a number of taxonomically important characters; habit, length of the pedicel, size of the flower, size and shape of the stigma, form of the fruit, and nature of the intrastaminal glands. He concludes that the structure of the intrastaminal gland (situated at the base of the ovary) has great taxonomic value. Two forms are recognized: (a) glands free and distinct, not connate; (b) glands connate to form a shallow cup at the base of the ovary.

In *T. terrestris* the intrastaminal glands are free and not joined to form a definite cup around the base of the ovary, whereas the closely related *T. cistoides* shows the presence of this cup. *Cytology* — The basic chromosome number of the genus *Tribulus* is six (Baquar, Akhtar and Hussain 1965; Malik 1966; Porter 1968). Chromosome races exist within *T. terrestris* where diploid (2n = 12), tetraploid (2n = 24), hexaploid (2n = 36), and octoploid (2n = 48) forms have been described (Malik 1966). Chromosome counts on material identified as *T. terrestris* have been reported from Argentina (2n = 48, Schnack and Covas 1947), California (2n = 24, Heiser and Whitaker 1948), India (2n = 12, 2n = 24, 2n = 48, Malik 1966), Italy (2n = 24, Negodi 1939), Japan (2n = 24, Sugiura 1940) and Pakistan (2n = 12, Baquar, Akhtar and Hussain 1965). Malik (1966) reports that, with the increase in the level of ploidy, taxa exhibited appreciable gigantism in most of the characters especially flower and pollen size. The chromosome status of Australian material has yet to be established.

Geographical and Altitudinal Distribution

Tribulus terrestris s.l. has a wide distribution, both latitudinally and altitudinally. The native range is Eurasian, between 30° and 50°N latitude from the central Russian Steppe, through Mongolia, Manchuria, Germany, Poland and the countries bordering the Mediterranean. Figure 1 shows the world distribution.

It has been known since 1903 as an alien in North America (Davidson 1903) and now extends from the eastern seaboard of U.S.A. through to Mexico. *T. terrestris* has been recorded in South America at localities ranging from the equator to Ecuador (Svenson 1946) through Peru (MacBride 1943) to 32°S latitude in Argentina (Descole 1943).

Harvey (1838) states that it was recorded from South Africa as early as 1794. The geographical range recorded by Schweickderdt (1937) is from Angola (15°S latitude) to Cape Province (35°S) and the altitudinal range from less than 100m. at 15°S to over 1000m. in Orange Free State (29°S).

On the Indian sub-continent it is well established as a weed of crops (Misra 1962).

The distribution in Australia of herbarium material placed under *T. terrestris* is a quite extensive ranging from the tropical areas to the southern sea shore, from the desert of central Australia to the coastal dunes of South Australia (Figure 2). It has been recorded in localities with annual rainfalls from < 5 inches to > 65 inches. *T. terrestris* appears to be adapted to a wide range of climates but optimally to semi-arid and Mediterranean types.

The limits of distribution of the introduced form have been defined by Squires (1969). The localities at which *T. terrestris* is considered a major problem are all within the zone with a normal daily maximum in January above 85°F (29.0°C). Outside this zone it is considered a minor problem. Relatively high temperatures are re-

Figure 2—Map of Australia showing localities from which herbarium specimens of *T. terrestris* have been collected. The dashed line represents the limit of distribution of the introduced form.

quired for germination and growth. The vegetative stage is extremely short. The minimum time recorded from emergence to first flower was 21 days at Deniliquin (35.30°S).

Polymorphism

Tribulus terrestris is exceedingly variable in both vegetative and reproductive characters. Schweickderdt (1937) in a study of South African *Tribulus* found that they were "very plastic with regard to size, shape and indumentum etc. of the vegetative parts" (p. 160). The length of the pedicel and flower size were found to have some taxonomic value. Taxonomically, the fruits were of the greatest value. He also remarks (p. 161) that "there appears to be evidence in favour of natural hybrids among the species of *Tribulus* from southern Africa".

No recent work has been undertaken on Australian material within the genus *Tribulus* for which at least 19 species have been described. Of these 18 species are based on Australian types.

For this study material identified in Herbaria as *T. terrestris* was collected from several localities in Australia (Figure 3) and abroad. The fruits were photographed (Figure 4). It will be noted that maximum contrast is found in comparison between the central Australian material (Figure

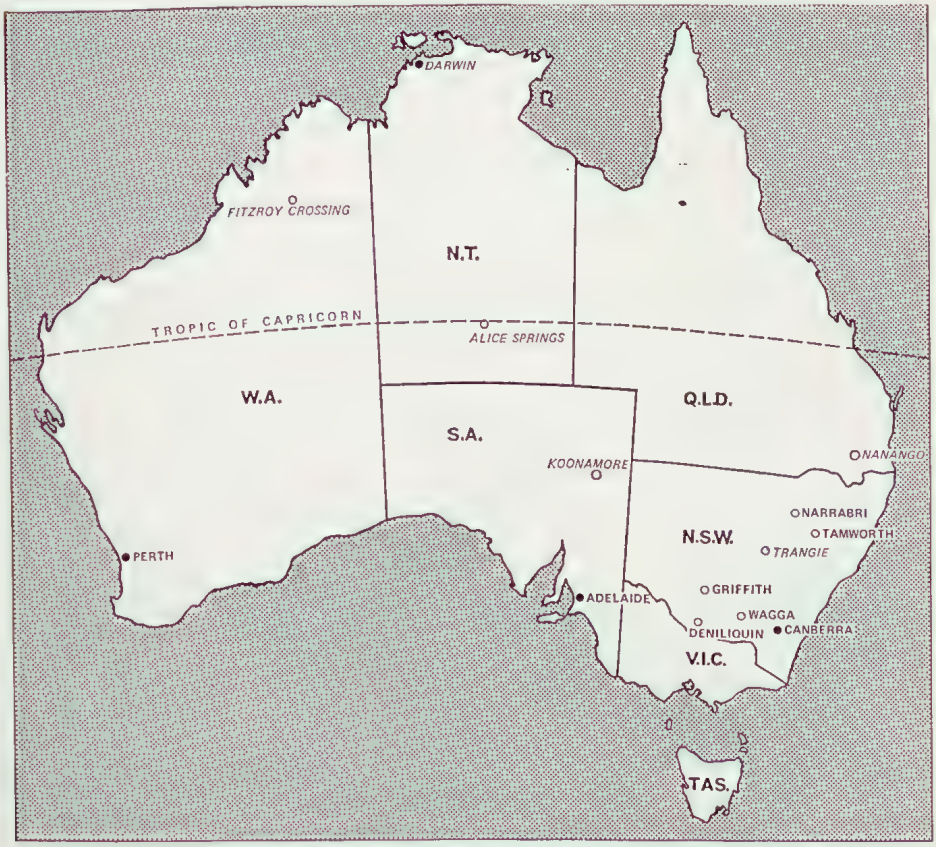

Figure 3—Map showing names of places mentioned in the text. The names of localities from which fruits of *T. terrestris* were collected are shown in italics.

4c) and that of the introduced form, whether of European origin (Figure 4a) or from Kansas, U.S.A. (Figure 4b). The number of spines and the degree of hairiness of the mature fruits differ considerably.

Forms from more arid regions (Alice Springs and Koonamore) are extremely hirsute (Figure 4c, 4d) while those from humid areas are glabrous. Four well defined spines are to be found on the form from Trangie (4g) and, indeed, on all of the southern Australian material examined by the author. Note that though the 4-spined form occurs at Fitzroy Crossing in the north-west of Western Australia, the spines are almost equal in length and both pairs project in the same plane (Figure 4h).

"Spineless" forms grade into normal forms, spined and spineless mericarps being found on the one schizocarp.

Examination of herbarium material shows that flower size is greater, petals up to 12 mm long, in material collected north of latitude 25°S. Description of the Linnean type suggest extremely small flowers (petals 3 mm long), but taking various standard works on the Floras of Central Europe and North America into account, one finds that the limits by which these various authors define *T. terrestris* L. show a wide discrepancy. Some define the petals as being "3-4 mm long", again "up to 10 mm long". The introsome state "6 mm long" and others duced form on which Squires (1969) based his studies had petals 5-6 mm long.

Discussion

Tribulus terrestris, as accepted in this paper, i.e. native and introduced, is an exceedingly variable species occupying a mosaic of micro-environments associated with soil texture, microtopography and other factors such as soil nutrient status, not readily apparent to human observers. It is probably impossible for a species, due to limitations of biological processes,

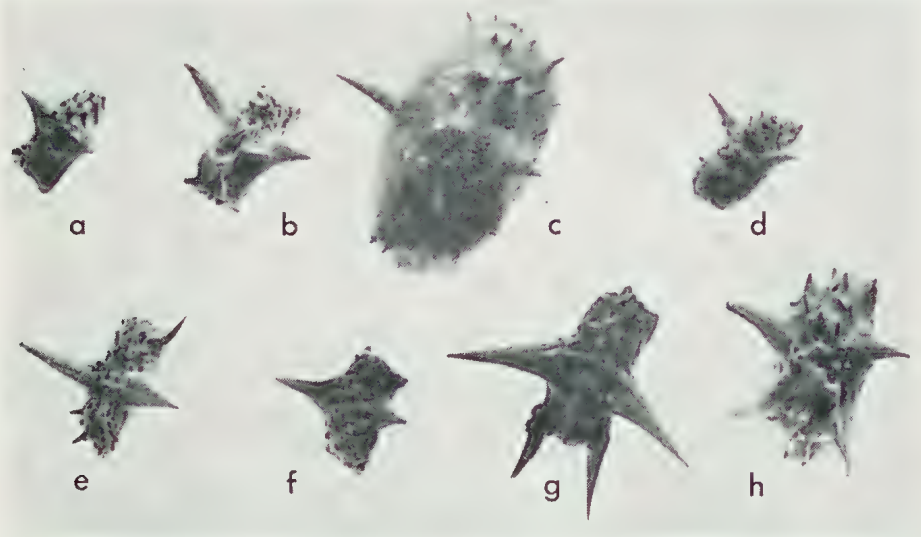

Figure 4—Identified as *T. terrestris* from a number of localities throughout Australia and overseas. (a) Paris (France); (b) Kansas (U.S.A.); (c) Alice Springs (N.T.); (d) Koonamore (S.A.); (e) Darwin (N.T.); (f) Nanango (Qld.); (g) Trangie (N.S.W.); (h) Fitzroy Crossing (W.A.).

to develop an all-purpose genotype with infinite plasticity to fit the mosaic of environments. This view of the pattern of ecological variation leads to the expectation that a population of *T. terrestris* occupying a land mass the size of Australia, should assume a genotypic mosaic corresponding to the mosaic of environments available (Allard 1965).

Clearly recognisable forms often occur within a single species which are related to differences in substrate, topography or climate. Differences between these "ecological races" may be so great that some taxonomists call them distinct species (Heisey and Milner 1965). An important property of ecological races is their ability to interchange genetic material in crossing. However, in some polyploid species barriers to cross-breeding may be present. Polyploidy itself adds considerably to the variability which might be recorded. Malik (1966) has suggested that intraspecific polyploidy has played an important role in the evolution of the diverse morphological taxa within *T. terrestris*.

It appears (Wilsie 1962) that polyploids are more tolerant of extreme ecological conditions than their diploid relatives and therefore have wider geographic ranges. However, this tendency is not universal.

From the viewpoint of weed control even slight variation in form can lead to considerable differences in response to herbicides. Sexsmith (1964) studied morphological and herbicide susceptibility differences among strains of *Cardaria chalepensis* (L.) Hand.-Maz. Strains varied greatly in leaf size and shape, spreading ability, stand density and reaction to treatment with several herbicides. Similar differences in response have been reported by Hodgson (1961) for *Cirsium arvense* Scop.

Careful breeding experiments and cytological examination of a range of Australian material would no doubt throw light on the question as to whether the material referred to *T. terrestris* is only one extremely variable species or whether at present several closely allied species are included under this name.

Acknowledgements

Thanks are due to the following people for collection of fruits of *T. terrestris*. Mr. D. E. Symon, Waite institute of Adelaide, Mr. J. R. Maconochie, Northern Territory Administration, Alice Springs, Mr. E. Cuthbertson, Mr. J. Ryan, Mr. D. McNamara and Mr. D. Pearson, officers of the N.S.W. Department of Agriculture, Mr. P. Cary, CSIRO, Griffith, and Mr. G. W. Meadly, Department of Agriculture, Perth, and Miss D. Johns, Plant Introduction Officer, CSIRO, Canberra, arranged for overseas material to be made available. Drs. P. W. Michael, R. H. Groves and N. T. Burbidge, CSIRO Division of Plant Industry, Canberra, gave freely of their time to discuss the problem of polymorphism.

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The photographs were taken by Mrs. J. Simpson, CSIRO, Canberra.

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Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor.

Our Neighbours, the Wattlebirds

This interesting note comes from Mrs. Ellen Lyndon of Leongatha, Victoria.

A pair of Red Wattlebirds control the territory we live in and most of the half acre of park opposite. They harass the Kookaburras and sometimes the Magpies by grasping their tail feathers and propelling them from the scene. Young Magpies on the ground are frequently dive-bombed quite savagely. Therefore it was with some surprise and not a little amusement that I observed a male Wattlebird being booted over the hedge of the big garden across the intersection, and this by a pair of irate Blackbirds.

In the spring of 1968 the Wattlebirds nested in *Melaleuca styphelioides* and raised one chick. As it matured they began building again in a nearby elm tree. A container of syrup was set up on our verandah railing and by Christmas one bird was sitting and the other running a shuttle service between the jar outside our window and the nest. The bird would launch itself across the busy road, swooping low and rising to the railing. It would sip and swallow several times, then take four or five quick dips in the syrup without swallowing, before flying back to a favourite perch, thence to the nest, presumably to feed the brooding mate. This behaviour pattern took place at frequent intervals during the day while the supply lasted. The jar was refilled at evening, for these birds are most active in the twilight, feeding up till 8 p.m. at least. Two young were hatched, and, as far as we could tell, the honey and water syrup was regularly fed to them. As they grew, large winged insects were caught, brought to the syrup jar and dunked, before being offered to the nestlings. Some of the victims were very big, judging by the extent of leg and wing protruding from the birds' bills. The liquid provided varied according to what was available on a particular day. Honey, sugar, golden syrup, home-made raspberry jam, stewed fruit juices, all diluted with water, proved equally acceptable. We always knew if a bee had fallen into the jar and was swimming round by the bird's frantic attempts to take a sip and leap back quickly. They have the greatest respect for bees.

Later the Wattlebirds were to prove rather a pest, for a party of Little Lorikeets arrived to feed in a flowering eucalypt. These beautiful little strangers quite distinct.

were new to me and I was to spend much time observing their antics as they hung head downwards among the blossoms and raced along the limbs on their tiny legs. The Wattlebirds took a perverse delight in following me across the park and falling upon the Lorikeets, flushing them and sending them screeching for cover.

But they are, on the whole, bold and cheerful birds, enlivening the scene when few others are about.

Galls

These notes come from Mr. A. J. Swaby of Surrey Hills, Victoria.

Last winter, each flowering tip of Cootamundra Wattle had three zones. The oldest had galls without tufts of stamens. Next, in greater number, came tufted galls. A much longer top had perfect flowers, enough to make a lasting display.

Eggs must have been deposited when buds were minute, not yet showing rudimentary florets and the insects, same or succession, about for many days. Early and more frequent inspection next season, should detect them.

Anyone interested in the emergence of mature insects from the galls should begin this month with a piece of nylon stocking slipped over the galls and tied at each end. That would apply for most species that bloom in spring.

Does each wattle have its special parasite?

Of Bread and Pumice

By J. B. CLELAND

If one can imagine a loaf of aerated bread becoming petrified, the result should be something like a piece of pumice stone. It is therefore quite possible that the preacher, in *Ecclesiastes* (Chapter 11, verse 1), was referring to a piece of pumice stone when he wrote, "Cast thy bread upon the waters for thou shalt find it after many days". This possibility raises several questions, and in attempting to answer them we must visualize the Biblical World of King Solomon.

Firstly, what knowledge could the Israelites have had of pumice stone? Secondly, what cereals and methods did they use in baking a loaf of bread (and in particular how was its aeration achieved so that a loaf could possibly float in water for some while)?

There are no active volcanoes in Palestine or Mesopotamia and these places are some distance by sea from any such things, either in the Mediterranean or the East Indies, so that the Israelites could have never seen an actual volcanic eruption. Pumice from either the West or the East would take a long time to reach the coast of Palestine on the one hand or the Red Sea and the Persian Gulf on the other. To the dwellers along those shores the arrival of light, floating, pumice would be a puzzle, and a likely explanation of it would be that it was bread that had been converted after a long period into stone.

This may or may not be the origin of the phrase, "Cast your bread upon the waters", but in any case one cannot accept the other explanation offered in *Brewer's Dictionary of Phrase and Fable*—"When the Nile overflows its banks the weeds perish and the soil disintegrates. The rice-seed being cast into the water takes root, and is found in due time growing in healthful vigour". This is not tenable, because rice was not grown in Egypt in the time of *Ecclesiastes* (possibly the 3rd century B.C.): its introduction there is believed to have come subsequently from the East with the Arab invasion.

When one considers the cereals used for bread in Biblical times one comes up against the puzzling reference in the *Book of St. John,* Chapter 6, verse 9 ("There is a lad here with five barley loaves, and two small fishes: but what are they among so many?"). Only wheat and rye contain the protein, gluten, which gives the necessary "glutinous" properties to their doughs and the characteristic bready texture on baking. It is possible to bake other cereal flours, such as oats, rice, maize, and barley into various cakes or biscuits by various baking techniques, but it is *not* possible to make a true bread in the absence of gluten. The lad in the New Testament therefore could not have had pure barley loaves. On consulting the original Greek text in *The English Hexapla,* I find the word was "Artos", which (according to Little & Scott's Greek Lexicon) is correctly translated as "loaf, especially a wheaten one": the Greek word for "barley-cake" ("maza") is not used in the verse at all. However, as Drummond & Wilbraham point out, barley-bread is mentioned not infrequently as a food of the poor in England when the Bible translators were at work,

and was popularly supposed to be a remedy for the gout. The probable explanation is that breads in olden times were often made of mixed cereals ("maslin bread") and a barley loaf would perhaps be a reasonable bread if it contained a proportion of wheat or rye to provide the gluten.

Finally, there is the intriguing art of aerating dough by the gases of fermentation. There are various references in the Bible to show that this leavening of bread was ancient knowledge, and it is interesting to ponder upon the way it was first discovered. One must assume that, as with so many other important technological advances in the misty prehistory of Man, it was a chance happening arising from his carelessness! It is easy to picture some unleavened dough left behind in a dish, which became invaded by yeast cells so that the next batch of dough was heavily seeded with gas-producing organisms that resulted in a desirable porosity on baking. And small portions of any such leavening could be added to subsequent batches of dough serially down through the ages until techniques became more exact. After all, as St. Paul pointed out (*The Epistle to the Corinthians* Chapter 5, verse 6), "Know ye not that a little leaven leaventh the whole lump?"

REFERENCE: J. C. Drummond and Anne Wilbraham (1939): *The Englishman's Food,* Jonathan Cape, London.

A Ball of Jelly

By A. J. SWABY

Rose Creek Road, in the Grampians, crosses the creek over a pipe drain. About a chain down-stream, the creek flows over bare rock. We sat there to cool off on a hot day about New Year.

A ball of jelly rolled over the rock. It was full of specks suggesting eggs. We kept it in water and watched. One morning at breakfast, signs of life appeared and the microscope kept us all busy in turn.

No—it was not water snail. Definitely the larvae were arthropods, and the eyes suggested a crustacean.

We put the jar on a sill in the shade. On return, we found them cooked.

Some day, one of the many naturalists living near or in the Grampians may conclude the story.

Arena

By A. J. SWABY

By McKenzie Creek, near Horsham, a warm Spring day and clean, white sand brought stumpy-tail out to bask. A large snake came too. They met.

The fight was fierce—over and over, tumbling and writhing, each made the most of its weapons. Fangs found a soft spot and stumpy's struggles became weaker. The snake had difficulty in swallowing the lizard. It crawled heavily away to find a sheltered spot for digestion.

Why did we let that go on?

We were not there, tracks came from opposite sides of the unused road and every detail of the struggle was clear, including the deeper impression when the snake went off with stumpy inside. We searched without result.

BOOK REVIEWS

SOUTHERN WALKABOUT

By VINCENT SERVENTY

A. H. and A. W. Reed, 1969
Hard cover with dust jacket. 9½ in. x 6¾ in., 160 pages. $5.50.

"Melbourne is one of my favorite cities. The broad tree-lined streets, the parks, the softness of the light, all add to its charm. As well it is in a sense the headquarters of Australian natural history. Here is the home of the Royal Australian Ornithologists' Union, the centre for strong natural history groups which include the Victorian Naturalists' Club and the Bird Observers Club," remarks Vincent Serventy in his latest book *Southern Walkabout*. Members will need no introduction to this author who is the Editor of *Wild Life in Australia* and producer of nature study films.

His book *Nature Walkabout* described the Serventy family's travels from Perth northwards traversing the top of Australia and south to Sydney. In this book the author, with his wife Carol and their three children, Kathy, Karen and Matt, complete the circuit of the continent from Sydney back to Perth. It is written as though all the events happened on the one journey, for continuity's sake, whereas they occurred during several trips across southern Australia.

Vincent Serventy uses a conversational style of writing, moving fluently from natural history observation, to historical anecdote, to accounts and reminiscences of friends and acquaintances met en-route. Throughout the walkabout the reader is introduced to many well-known names on various scientific expeditions. These names become personal friends as we share the excitement of making new wild life discoveries with them. We are given a glimpse into the private lives of these people—their personalities and love of the Australian bush.

"The leader of the [Australian Geographical Society's expedition to the Recherche Archipelago] was John Bechervaise, geographer and later to become well known for his work in the Antarctic. With him came James Willis, botanist, of Melbourne. They were delightful companions. I remember one day when Jim did a series of beautiful cartwheels along a sand beach in sheer exuberance at the scientific finds of the day."

Many historical facts have been researched and noted. For instance, it may be of some comfort to the reader to learn that William Dampier, the early English navigator, when at the Swan River Settlement in Western Australia, suffered the same annoyance we all experience with the Bush fly. ". . . to sleep after sunrise was impossible on account of the number of flies which kept buzzing about the face."

A great deal of knowledge is to be gleaned from the book as information on various subjects has been gathered together to collectively make a handy reference work. Answers to such questions as who subsidised the erection of Captain Cook's Cottage in Melbourne, what is "anting", which is the world's most dangerous snake, and how are the giant (over 200 feet) Karri trees felled?

Many people would not consider such a long journey much fun with a young family. However the Serventy's have proved that enjoyment can be obtained although you have to be pre-

pared for some accidents whilst children are making their own natural history discoveries.

"Suddenly I heard a splash and a shout from others on the bank, and I looked over to see a body disappearing under water. I waited and up like a cork bobbed Matt. I reached down and with a smooth heave had him out on the jetty, wet, gasping but unharmed.

"He was more careful after that, and kept one hand for jelly blubbers and the other for gripping."

Over a hundred very fine coloured photographs, taken by the author and his wife, elaborate and demonstrate various points in the text.

Southern Walkabout is a book very suited for introducing both children and friends to natural history. It is a pleasant readable book, amusing as well as being an adventure story with a difference. People who have seen and enjoyed the T.V. series "Nature Walkabout" will find the book as absorbing as the films. It should encourage readers to take part in the struggle for the conservation of the Australian bush and wildlife.

Rex and Sue Filson.

• • • • • •

Three Recent Botanical Publications

Wildflowers of Tasmania

By H. J. KING and T. E. BURNS

Jacaranda Press Pty. Ltd., Milton, Qld., 1969.
5¼" x 4". 50 plates in colour. Price $1.95.

This is the fifth in a series of Jacaranda pocket-books, each of which portrays in colour 50 different wildflowers that typify a particular State or major region in Australia. With its publication last June we now have an attractive gallery of 235 plant series in 143 genera, including 16 kinds or orchids, 14 wattles and six species of *Grevillea, Boronia* and *Helichrysum.* Such superficial sampling of Australia's vast floral wealth is bound to disappoint those who may hope to use the "pocket guide" as a means of identifying their various finds, and it is regrettable that the publishers have allowed no less than 13 species to be duplicated among the five booklets—*Banksia marginata* appears three times (in the guides for New South Wales, Victoria and Tasmania).

Most States can claim fairly up-to-date popular books on their native flowers, but the last Tasmanian publication was Leonard Rodway's *Some Wild Flowers of Tasmania* (Government Printer, 1922). It contained 58 brown-tone photographic reproductions, some very poor and "fuzzy", illustrating a series of chapters on such topics as Pea-flowers, Eucalypts, Orchid Family and Non-florals. So the appearance of this new booklet, under review, is particularly welcome. In many ways it is the most pleasing and informative in its series, and more than one quarter (actually 14 species) of the plants depicted are Tasmanian endemics. All plates are from colour transparencies by Mr. H. J. King, Tasmania's indefatigable, masterly flower-photographer. His portraits of Blue Gum (the State's floral emblem), Christmas Bells (at the end of the guide) and close-up of Five Corners (single greenish trumpet-flower of a coastal heath) calls for special praise, but the almost exclusively funereal backgrounds of the flower-studies tend to become rather

tions are inaccurate, for instance *Bellendena* does not signify "beautiful native" but commemorates the name of John Bellenden-Ker, a British botanist of the early 1800's—with Royal assent he had changed his surname from Gawler in 1804.

Australian Eucalypts

By MERVYN MILLETT

Lansdowne Press, Melbourne, 1969.

7¼" x 5". Pp. 111. Illust. 118, 40 being in colour. Price $1.25.

Notwithstanding a spate of literature devoted to Australia's most important (and second-largest) plant genus, *Eucalyptus,* there is undoubtedly room for more and especially for inexpensive books of digest size. Lansdowne Press has wisely added to its "Periwinkle Nature Guides in Colour" a volume on our eucalypts. Only 33 representative species are described, in some detail; but the aim of the book, as stated on page 24, is "to introduce the reader to the eucalypts", and in this it succeeds very well. In fact, the reviewer has seldom read a more stimulating or meaty introduction to eucalyptology.

Beginning with the history of early investigators from the time of Tasman (1642), we are led to the manifold uses of eucalypts (the author takes exception to the familiar term "gum-tree" which is a silly misnomer), the pests that attack them, their classification, nomenclature and identification. For each of the selected species, culled from all over the Commonwealth, there are pertinent notes on the habit, bark, foliage, habitat, range and timber, accompanied by a life-size drawing of buds and capsules and a full-page photograph of the tree in black and white. The 40 colour pictures are generally attractive, in particular those by Dr. J. Child; plates of spectacular *Eucalyptus tetraptera* (on the front cover), the crimson-flowered hybrid "Torwood" and the wrinkled greenish trunk of *E. stellulata* are highly commendable. A glossary of scientific terms, a list of works for further reading and indices to both botanical and common names complete Mr. Millett's useful book which is more than good value for $1.25. It will undoubtedly be popular, and may it help to increase public interest in a unique national asset—our diversified eucalypt flora.

Orchids of Western Australia

By ALEX S. GEORGE and HERB E. FOOTE

Westviews Pty. Ltd., Perth, 1969. 9" x 7". Pp. 30. Colour plates 39. Price not given.

One would have thought that, after the second edition of Mrs. Rica Erickson's *Orchids of the West* (Lamb Peterson Pty. Ltd., 1965), there would be little demand for another, considerably thinner booklet on the same subject. But the pattern is entirely different. Here we find close-up colour portraits of 36 different orchids (one quarter of the State's total), reproduced with great clarity on glossy grained paper from photographs by Herb Foote who is President of the Orchid Society of Western Australia. Alex George, of the Western Australian Herbarium, has written 30-100 words of descriptive text about each plate. These pictures are a sheer delight, worth having for their own sake, and they embrace no less

than 20 species of the spider-orchid genus *Caladenia* which attains its highest morphological diversity in this South-West region. Attention is drawn to some of the more interesting features of Western Australian *Orchidaceae* on the two middle pages of the brochure which, unfortunately, is neither paginated nor indexed.

—J. H. WILLIS.

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Australian Butterflies in Colour

Photographs by E. R. ROTHERHAM, text by ALEXANDER BURNS.
Syd., A. H. and A. W. Reed, 1969. $3.95, Hard cover with dust jacket.
Approx. 7" x 7½", 112 pages.

Many older members may have commenced their natural history careers as butterfly collectors. Armed with net and specimen bottle many happy afternoons were spent chasing butterflies over the paddocks. This hobby seems to have lost its popularity over recent years. Could it be that people are becoming more lazy and would rather indulge in less energetic hobbies? Could it be that the ever increasing use of insecticides has realized a decline in butterfly numbers? Perhaps this book will help to revive interest in these brightly coloured insects.

When Alexander Burns collaborated with Charles Barrett to produce "Butterflies of Australia and New Guinea" collectors thought this to be the answer to their prayers as it provided good descriptions with sixty species illustrated in colour. "Australian Butterflies in Colour" illustrates eighty-five species, the text has been expanded, new name combinations included and an excellent distribution map accompanies each species.

The format of the book is similar to others in the series, with a page of text facing a page of coloured illustrations. The publishers have corrected a bad feature of earlier works seen by the reviewers, by including the captions for the illustrations underneath the pictures and not on the text pages. Where the male and female butterfly are different, they are both illustrated.

The text is arranged in columns. It is comprehensive, giving a full description of each butterfly, its life cycle—eggs, larvae, pupae—distribution and interesting notes on varieties and races.

E. R. Rotherham, a member of the F.N.C.V. and co-author of "Flowers and Plants of Victoria", took the excellent clear photographs. His choice of background highlights the detail of the wing structure and natural colouring of each species.

The Introduction gives a brief history of publications on Australian butterflies, a few essentials on the classification, life cycle, feeding, distribution, migration, predators, sexual attraction, seasonal coloration, wing structure and sexual dimorphism of the insects. The frequent question on the difference between a moth and a butterfly is answered.

Both common and scientific names are listed in the index. A short errata is tipped into the book.

If you did not graduate from butterfly collecting, after reading "Australian Butterflies in Colour" you will wish you had. The book serves as a good introductory text for the amateur as well as being an authoritative work for the serious collector. This is a book for every naturalist's library.

—REX and SUE FILSON.

More Grinding Rocks at Munro

By ALDO MASSOLA*

At the invitation of Mr. S. C. Fletcher, of "Eastwood", Munro, I was enabled to inspect five additional sites with either single examples or groups of small fine-grained sandstone outcrops bearing grinding grooves made by the Aborigines in grinding their stone axes. These occur both on Mr. Fletcher's and on nearby properties, and I here wish to express my thanks to him and to his neighbours, whose names appear in the text, for their hospitality and for the time they spent in taking me around.

The articles dealing with previously discovered grinding rock sites in this area were published in the Victorian Naturalist, **84,** p. 207 (Massola) 1967; **86,** p. 152 (West) and p. 208 (Massola) 1969. These papers reported six sites, of which the first four were unfortunately given conflicting numbers, and the next two were left un-numbered. Allowing for those six, the first of the new examples should become known as Site No. 7.

Site No. 7 consists of a single rock not now in its original position, having been dug up during farming operations; but it remains close to where it once was, about 100 yards west of Eastwood homestead. The rock surface measures 3 ft. by 2½ ft., and bears one grinding groove about 7½ ins. long by 2½ ins. wide.

Site No. 8 is also a single rock of similar size to No. 7, and like it, it only bears one grinding groove about 7½ ins. long and 2½ ins. wide. This rock is still in its original position, about a quarter of a mile south-west of my original No. 1, not far from the south fence of "Eastwood".

* 4/18 Wolseley Street, Mont Albert 3127.

Site No. 9 is on Mr. John Bedwell's property on the north side of the highway, opposite "Eastwood". It is about one and a half miles north of my original No. 1, and is easily found since it protrudes from the ground about the centre of the car track leading to Mr. Bedwell's homestead. The rock measures about 4 ft. by 4½ ft., and bears two grinding grooves, one about 10 ins. long by 2¾ ins. wide, and the other about 10 ins. long and 2¼ ins. wide.

About 36 feet south-east from this rock there is a second one, which was almost entirely covered by the soil. When uncovered we found it to measure about 3 ft. by 3 ft., and to bear a grinding groove about 10 ins. long by about 3 ins. wide.

The paddock in which these two examples occur (Site No. 9) is on a noticeable rise and has been ploughed many times. These two rocks are possibly the only surviving ones, all others in the area having been dug up over the years, and it is strange that they should both bear grinding grooves. About 200 yards west of these outcrops there is a waterhole, which was once a swamp.

Site No. 10 consists of a smallish rock, measuring about 2 ft. by 1½ ft., with one grinding groove about 5 ins. in length and 2¼ ins. in width. It is one of several rocks (of which only this one bears grinding marks) outcropping in a clump of trees on high ground about half a mile south of No. 9 Site and on the same property. Water for this site is available from two places on the low ground, both of which are about 100 yards away, one to the north-east and the other to the south-west of the clump of trees; and

Mr. Bedwell affirms that water remains there quite a long time after rains before evaporating or being absorbed by the soil.

Site No. 11 consists of a small group of boulders outcropping in one of Mr. R. G. Duncan's paddocks, about one mile west of No. 10 and about one mile north-west of my original No. 1. Three rocks of this group bear grinding grooves. One rock measures about 6 ft. by 5 ft., and has four grinding grooves upon it. each measuring about 7½ ins. in length and about 2½ ins. in width.

The second rock is about 3 ft. by 2 ft. and has one grinding groove measuring about 10 ins. in length and 2½ ins. in width; and the third rock, also measuring about 3 ft. by 2 ft., has a grinding groove about 5½ ins. long and about 2½ ins. wide. Water for this group is available from a small swamp about 100 yards to the north-east.

The finding of these new examples suggests both that more will be located and that they were once very numerous in this area. This part of the country was amongst the first selected when the Great Plain was opened up, and the first settlers and their employees built for themselves the usual type of timber and bark huts with stone chimneys. In this locality the small sandstone outcrops are the only stone readily available, and by using them the settlers were at the same time clearing the land and making it suitable for pasture. All these paddocks have been repeatedly ploughed, and many of the boulders thus brought to the surface have been heaped along the fences; although no grooved ex-

A close-up of Rock A, Site No. 9, at Munro. *Photo*: Author.

A typical hut of the district, built of bark and timber with stone chimney.

Photo: Author.

amples were found amongst the heaps examined by us. However, some of these boulders have been used in raising low points along the tracks, and these, of course, could not be examined.

The distance between some of the grooved rocks still in their original position (4 miles between No. 9 and the un-numbered example north of Fiddlers Creek) invalidates my original assumption that the camp of the local Aborigines must have been on the sand ridge close to my original No. 2 site. At the time, of course, only two sites had been reported, and with the sand ridge being within easy reach of both sites and near permanent water it appeared to me that if there were a camp in the area, this would have been the obvious place. With the discovery of all these new sites and the probability that more will be found, or that others once existed, it becomes clear that there probably was no central camping place in the area, and that this particular sand ridge was only one of the many that could have served this purpose.

The uniformity and flatness of this extensive plain is broken by a number of such slight terrain undulations and low ridges of fluviatile sand and gravel. According to accounts solicited from local "old timers" the plain was originally covered by an open forest of red gum, stringy bark, and red box. There was little or no scrub or even tea-tree, and only a sparse growth of bracken on the sand ridges. Water was plentiful, not only in creeks but also as surface water lodged on the low ground. Food animals were numerous — despite the clearing of the land. emus and kangaroos are still a common sight — and the plains must have been covered with an infinity of edible roots.

If any Aborigines lived in this locality they would have had little trouble to obtain subsistence locally, and would have had frequent visits from other groups they would have a fairly small group who wandered leisurely over their territory, camping here and there as fancy dictated, and passing time away in grinding river pebbles on the numerous finer-textured sandstone outcrops. In other words, much the same set-up would have existed here as did at the famous axe-stone quarries at Mt. William, near Lancefield, on the

operating of which we have contemporary records. Like their Mt. William counterpart, as well as using the outcrops themselves, the group at Munro would also have allowed visiting groups to use them for a payment in kind that they may have needed, such as weapons or fur rugs.

The finding of two hammerstones, one of which has a pitted area on one of its faces — showing that it had also been used as an anvil for chipping stone implements — is a further indication of the local industry. These were found by Mr. Fletcher and myself during my last visit to the locality, on a gravel ridge exposed by quarrying operations, not far from my original No. 1 site.

On the other hand the locality could well have only been visited by the Aborigines during expeditions taken for the purposes of renewing their supply of axes. The large camps found on the cliffs overlooking the lower reaches of the Avon and the Perry Rivers, and at intervals on the high ground along the shores of Lake Wellington suggest that the local tribe, the Braiakolung, lived mainly there.

One such camp, an important one, was situated on top of the hill on the west side of the Church at Bengworden; and another on Boney Point, a point of land at the junction of the Perry and the Avon Rivers. This point was so called because on it a considerable number of human bones became exposed by erosion, marking the site of yet another unrecorded tragedy. Obviously, some of the Braiakolung camped there were surprised and massacred either by white men from Coady Buckley's Station, or by the Native Police during the search for the White Woman supposedly held by the Gippsland Aborigines.

From these camps, before the coming of the white men, the Aborigines would set off for their seasonal excursions into the inland by following the rivers; these latter being the highways in heavily timbered regions, such as Gippsland was. In the case of both the Perry and the Avon, this would lead them to the inexhaustible supply of well-shaped water-worn pebbles, eminently suited and ready-made for axe heads, found on the upper reaches of both rivers. Their inland camps would be in the few open tracts of land close to the rivers, such as the one about a mile north-east of Stratford, on a large consolidated sand dune at the south end of a swamp, between the Princes Highway and Cross Creek, the latter a tributary of the Avon River.

Having loaded themselves with suitable pebbles, the Aborigines would then wander over to the grinding rocks, such as those on the Boisdale Estate (see *Vict. Nat.* **82**, p. 9, 1965) or at Munro, and no doubt at other as yet unreported places. There the several family groups would spread out, each to one of the grinding sites, and construct rough mia-mias and windbreaks as shelters while they were there. Food and water was plentiful, and the actual grinding process, contrary to general belief, did not take long.

Once ground the axes were probably not hafted, but carried back to the lake-side camps in net bags, this being an easier way of transport. Hafts could always be fitted as required at a later period.

I realize that the above picture of the local tribe is imaginative; but it is founded upon well known and undeniable habits of the Aborigines. In any case, the presence of the grinding rocks, spread as they are over a vast area and probably with a far greater distribution than at present known, gives weight to my reconstruction.

A Trip to the Grampians

August, 1969

By NANCE MARRIOTT

My husband and I had an exciting week here from 23 August, 1969. We intended following the 1968 trip as described in the *Vict. Naturalist* for June and July.

Armed also with *Victorian Naturalist* copies as far back as 1938, we set out to find plants mentioned in these articles. Such was the abundance of flowering plants along the roadside from Stawell, where we hired a very comfortable cabin at the local camping park, that we did not get far into the Grampians themselves.

Along the Rose's Gap Road, we could not bear to drive on — the abundance of flowers of which we had only read, was a veritable garden.

The various peas; *Grevillea parviflora,* almost entwining itself among other plants; the tiny banksias and larger ones; the beautiful *Grevillea aquifolium* and *G. alpina,* all were there in glorious array. Apart from these there were orchids, acacias, hakeas, and oceans of thryptomene.

On other trips the Helmet Orchids were so numerous that we could hardly avoid standing on them along the tracks.

Near the bridge in Hall's Gap we looked down on to a beautiful specimen of *Grevillea dimorpha* (Flame Grevillia); one plant on its own, of about 5 ft. high and width of 4 ft. It was in full flower. Here also the purple mint bushes were just beginning to flower, as also a mauve lily.

The Astrolomas were magnificent. Two places which interested us were a private property a mile or so before the Sister Rocks coming into Stawell, where Golden Wattles were a picture in recently ploughed soil; and a corner of Crown or council land just after crossing the railway line to Stawell. Here, hundreds of *Grevillea aquafolium* were flowering from pale green through lemon-orange to bright red. An area such as this deserves to be ·nced.

It would be impossible for us as amateur naturalists to hazard a guess at the numbers of species we saw on this our third visit to the Grampians.

Never before have we seen anything like the number and variety of plants flowering. Maybe this was due to the warmer winter preceeding our holiday?

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Sawfly Saga

By ERIC SIMS

On 13 November, 1968, we found on the ground in our Adelaide suburban garden a cluster of sawfly larvae which had apparently just descended from our *Eucalyptus lehmannii* intent upon burying themselves in the soil to pupate. They were certainly well-fed, plump specimens with the usual, bristly, caterpillar-like appearance and the usual habit of rearing up their "tails" to eject offensive globs of goo when we picked the living mass up to place them in a tin containing a bed of earth. Pupation occurred the same day, each burying himself and spinning himself a cigar-shaped papery cocoon, about an inch in length, liberally encrusted with a coat of caked dirt. We roofed the top of the tin with a sheet of perforated plastic, and waited patiently.

The summer of 1968-69 in Adelaide was quite a mild one, and the tin was left in our back verandah under reasonably equable conditions. The first two adult sawflies emerged on 3 March, 1969, and eight more emerged at intervals over the next eight days. They had the typical appearance of such creatures, which, of course, are not flies at all: they are relatives of the bees and wasps in the Order Hymenoptera, and accordingly are four-winged (not dipterous like true flies). Our specimens were heavily-built insects, about an inch long, with no "waist" between the thorax and abdomen, and with a white dot externally on both sides of each abdominal segment. On first emerging they were light brown in colour but tended subsequently to darken on exposure to the air. Moreover, they still had a definitely antiseptic, "eucalyptusy" smell. The Information Officer of the South Australian Museum identified the genus of one specimen we submitted to him as *Perga*, so we are tempted to assume that it was *Perga dorsalis*, which is the "gum sawfly", although certainly not of the "steel-blue" colour that the books ascribe to this species.

After the last emergence on 11 March (118 days after pupation) we waited anxiously for the rest of the original fistful of larvae to appear as adults, but nothing happened for another month. Then, on 15 April (35 days after the last sawfly had

Figure 1:
Sawfly larvae.

Figure 2:
Dead Sawflies (*? Perga dorsalis*) after emergence, 118 days after commencement of pupation.

emerged, and therefore 153 days after the original pupation) an ichneumon wasp emerged, followed by eight more over the next six days. The exact species could not be identified by the ever-obliging Information Officer at the S.A. Museum, but perhaps the photographs will help a reader to supply the name? In any case, I still have specimens for any expert who might be interested. Ichneumons, too, are in the Order Hymenoptera, and so have four wings, but there the resemblance to their distant relative (and erstwhile host), the sawfly, ceases. Our ichneumons were really elegant creatures, with antennae as long as themselves, slender waists behind the thorax, and pink abdomens marked with a series of black bars. There was no obvious ovipositor in any of them so we assume they were all males. The eggs from which they developed had apparently already been injected into the sawfly larvae in November, so that the ichneumon larvae in due course could consume the *Perga* pupae and go through their own metamorphosis, subsequently within the shelter of ready-made cocoons. This fascinating phenomenon, of course, is no new discovery, but the time sequence of events in our little study is perhaps worth recording, and illustrating.

Acknowledgments

I am indebted to Joan Paton and Ray Boyd for the photographs.

Figure 3:
Ichneumon sp. which parasitized the sawfly larvae, and emerged 35 days after the last adult sawfly.

MAMMAL SURVEY GROUP

ANNUAL REPORT

July 1968 — June 1969

The group carried out 14 surveys during the year, in eight different areas of the State. Details of the survey effort and a summary of results are given in the table below.

The surveys of Stockman's Reward (undertaken by two members of the group as a special project for the Science Talent Search) and of the Riddell area are published as papers III[1] and IV[2] in the series "Native Mammals in Victoria".

Sample surveys in the Brisbane Ranges are nearing completion; those in the Lerderderg Valley, the Kinglake Ranges and the Otways are about half completed, and work in the Yarra Valley and Mornington Peninsula has begun.

Survey camps have been supported by an average of 13 members and visitors during the year.

The recording of chance sightings continues, and about 230 reports of the presence of 33 species throughout the State have been recorded. It is intended to publish the data that has been collected in this way as a contribution to the knowledge of the general distribution of native mammals in Victoria. The results of the survey of the metropolitan area in Melbourne are likewise being prepared for publication.

Monthly meetings of the Group have been attended by an average of 14 members and five visitors. Membership has increased this year to 33.

Financial assistance has again been received from the M. A. Ingram Trust for the purchase of equipment, and the Group wishes to acknowledge also the assistance received during the year from the Botany Department, University of Melbourne, the Geelong Field Naturalists Club and the Fisheries and Wildlife Department, Victoria.

1. Vict. Nat. **86**, 48, 1969.
2. Vict. Nat. in press.

Summary of Survey Results

1968-69

Area	Number of Surveys	Trap-nights	Specimens caught	Spot-light hours	Specimens seen*	Species identified†
Otways	2	558	101	40.5	77	15
Brisbane Ranges	2	144	9	29.5	37	7
Lerderderg Valley	2	232	34	17.0	38	11
Macedon	2	154	21	27.3	52	9
Kinglake Ranges	2	162	45	46.5	52	8
Central Highlands	2	259	74	23.4	52	19
Yarra Valley	1	55	6	11.0	2	5
Mornington Peninsula	1	78	2	21.3	38	7
Totals	14	1642	292	216.5	348	27‡

* Including daylight sightings.
† From all sources of evidence.
‡ 12 native and 5 introduced species.

Some Interesting Fungi

By ELLEN LYNDON

Sometimes when fungi hunting in the bush, especially in sand country, we pick up dry fronds of bracken fern apparently decorated round the edges of the leaflets with what looks like bobble fringe, scaled down to fairy size. These minute "toadstools" are the spore capsules of one of the more lowly fungi known as Myxomycetes, or Slime Moulds. They are not uncommon but being so tiny often pass unnoticed on the forest floor, where they play their part in breaking down the plant debris. This particular one is named *Didymium squamulosum*. The fruiting bodies are more or less globular, and under the microscope are seen to be covered with starry clusters of calcium carbonate. They are attached to the host plant, in this case the fern leaf, by comparatively broad columellas, or stalks.

Didymium squamulosum

Hericium coralloides

Photos: D. Lyndon.

Hericium coralloides

During the fungi season in the Darlimurla area last year a fine clump of Hericium appeared in the decaying recesses of an immense fallen Blackwood butt lying in the gloom of a sheltered gully. It was first noticed and photographed in late April but was slightly past its prime and turning yellowish. On 14 April of this year, after a burst of surprisingly hot days, the log was inspected again. Although the bush had been opened considerably by forestry operations the fungus had fruited again in the hollow. Later, on 25 May, with the overhead forest gone and the log further exposed, Hericium was not only looking healthy in its original site but had burst through the upper part of the log and formed a fresh clump of the odd toothed branches. Overseas authorities seem to agree that this fungus is edible and good, but who would want to eat such a rare and lovely thing?

Tricholoma nudum, an attractive mauve mushroom, considered to be an introduction associated with oak trees, was picked up on sand dunes at Yanakie on June 4th in company with a variety of other fungi. This is the second record in sandy country far from human habitation. It may be of note that the dunes are heavily camped and tramped by agisted dairy cattle.

Tricholoma nudum was recorded again on the foreshore at Inverloch, 15/7/69, growing under teatree on top of the dune above the beach. Close by was a colony of another Tricholoma, almost certainly Tricholoma personatum, the Blewit or Blue Leg. These were short of stem and very wavy edged and shed the same pinkish buff spores. Although closely related these two edible mushrooms are quite distinct.

Field Naturalists Club of Victoria

General Meeting
10 November 1969

The President, Mr. E. R. Allan, was in the chair and about two hundred members and friends were present. Members were sorry to hear of the illness of Mr. G. Hooke, and the President is sending to him their good wishes for his recovery.

Sympathy was also expressed for the Editor, Mr. G. M. Ward in his distress at the fatal accident to a near relative.

The minutes of the previous meeting were taken as read on the motion of Mr. Swaby and Mr. Morrison. Eight new members whose names appear in the November *Naturalist* were elected on the motion of Mr. Lewis and Mr. Garnet.

The Secretary, Mr. D. Lee, said that a letter from F. A. Alford had said that the current mining fever in Australia has revealed an interesting connection with Sir Baldwin Spencer, as many letters variously addressed to him from mining companies had been received; Darwin records having shown he was the registered owner of a piece of territory. The subject for the evening was "Aboriginals of North and Central Australia" illustrated with Sir Baldwin Spencer's films which were taken before 1913 — the first ever made of our Aboriginals. These were presented by Mr. Owen West, Anthropologist at the Museum. He pointed out the importance of these films historically as it is claimed that Sir Baldwin Spencer was the first in the world to take anthropological films shot in their environment.

Mr. West reminded members that actual moving pictures were first shown in 1895 in Paris, and the next year, 1896, there were seven cinemas in Australia, two in Sydney and five in Melbourne. That Spencer thought to use it five years after its arrival in Australia shows his foresight. His first film was taken in 1901 of Central Australian natives. Mr. West said that Baldwin Spencer was born in Lancashire in 1860 and on taking a course in Fine Arts was led to Biological Morphology and therefore an interest in Biology.

At Oxford, studying Zoology and Anthropology he was with Dr. Edward Tyler, interested in primitive peoples and Dr. Moseley of the "Challenger" who was a keen observer of native people. Dr. Tyler was a referee when Baldwin Spencer applied for a Zoology position for Melbourne.

In 1894 he joined the Horn Scientific Expedition as a still photographer and Zoologist for three months and studied aborigines, and met and became a friend of Frank Gillen from the telegraph station at Alice Springs, a friend of aborigines in the Centre. Thus began an alliance that lasted till the death of Gillen in 1912. He belonged to the Witchetty Grub totem.

In 1896 Spencer returned to the Centre with Gill and published in 1899 an authoritative book "Native Tribes of Central Australia" and then Northern Tribes. He travelled from Adelaide to the Gulf of Carpentaria and made four trips between 1901 and 1926. For a year in 1912 he was the Northern Territory Commissioner and Protector of Aborigines. For seven years he was president of the Professorial Board and associated with the museum which holds his native collection. In 1916 he gave films to the museum. He was interested in Art and sport — one time president of the Council of the Victorian Football League.

When he was 68, in 1928, he became a purser on a British merchant ship going to Tierra del Fuego. He wished to study primitive peoples still. At 69, just after his birthday, he died in Patagonia.

When he took his first cine photographs of the aborigines in 1901, he experimented also with an Edison phonograph with wax cylinders, recording songs. These Mr. West played. The first song related to a tradition of a Snake Man. After this 1901 record, Mr. West played the same song recorded in 1968 on modern equipment, sung by an aborigine in Port Augusta.

A second song — Laborer Song — was recorded in 1901. Both of these were introduced by Spencer whose voice came over clearly on the old record. The second song was also repeated in a 1968 record. The first recordings were taken north of Oodnadatta, and when natives were given a chance to experiment with the phonograph, they thought there was a devil in the trumpet when it was replayed to them.

In April 1901 near Charlotte Waters a native camp of 30 or 40 natives decorated with high headdresses gave a dance which Spencer filmed without instructions on the rate at which to turn the handle. He stood it at the side of the large area to be covered and could not follow the movements when the performers often ran off into the scrub and ran on again. He said he had to just keep turning at an even pace and "rise to the mentality of an organ grinder". The dance filmed has been described as the Witchetty Grub Dance. Mechanical problems with the primitive machine had to be overcome. Heat and dryness caused wood to shrink and cracks appeared, but they were stuffed with fibre and porcupine grass resin to keep the light out. Dust was also a great problem. This film (1901) was used up in the Macdonnells, and sent back to Melbourne to be developed. In all they included Kangaroo Ceremony; Rain Dance; others of seated groups; preparation for ceremonies; corroborees for all, including women; witchetty grub increase ceremony (performed at Emily Gap); sun ceremony; and eagle hawk ceremony (some beating time with boomerangs).

In a women's corroboree the women stood in a straight line and swayed. Their decorations were a white band on the head. This was made of the recently arrived rabbits' white tail fur stuck on with human blood, and a long string of the fur hanging down one side of the head. This material was the tail tips of several hundred rabbits.

In 1904 he spent twelve months in the Northern Territory and took better apparatus that would move the camera with the performers.

Some 1912 films showed a ceremony with a bullroarer, snake ancestor ceremonies, and a cooking scene. A Melville Island burial ceremony after a mound covered with paper bark had been left for about a year showed dancing with excited laughter and talk to please the spirit of the dead person.

The President thanked Mr. West for the trouble taken in arranging the commentary and presenting these historic films and records. This was supported with enthusiasm by the audience.

In answer to a question Mr. West said the original film was found to be dangerous as it could disintergrate in flames, so a few years ago it was copied and reduced, and the original stock destroyed and a few copies were made.

He said that Mr. Curtis, who was present, was associated with processing some of the films. Mr. Curtis then said he had projected them at the first showing in 1913 in Melbourne Town Hall, and had processed the Bathurst Is. films.

Mr. Garnet pointed out that Sir Baldwin Spencer was also the President of F.N.C.V. for two years, President of the Royal Society, and the first Chairman of the Wilson's Promontory Committee in 1908.

The difficulties of transport were emphasised by Mr. West. In 1901, they had camels to carry films and 30 odd cylinders from Alice Springs to Oodnadatta, and then they went by rail to Adelaide and then by ship to Melbourne. In the 1912 expedition to the Northern Territory they travelled by various means including an old motor. Aborigine porters most of the time carried the huge tripod and heavy cameras.

Mr. J. Baines regretted the difficulty of getting the publications of Spencer now, and he pointed out that in America a paperback of Native Tribes of Central Australia is available. He also asked Mr. West if there had been any films of Spencer's South American journey. None has been received but Lady Spencer donated to our museum artifacts from there.

The Secretary said he had received a letter from the Caloundra Branch of the Wildlife Preservation Society of Queensland pointing out the danger of destruction of a primitive and beautiful area at Cooloola. Cards of protest to be sent to the Queensland Government were on the table for members to sign and post. Miss Piper spoke of the great beauty of this area and the need to keep it.

The Secretary had also received a telephone enquiry about an article in the *Naturalist* on Bald Hill Legends of the Dream Time of the Aborigines; and asking if it will be covered by the water of Cardinia Creek Reservoir. (The article is in Vol. 78, Aug. 1961.) A map of the proposed dam was on the table.

Miss Janet Raff sent a donation towards expenses in establishing co-operation with country clubs as Mr. Swaby had suggested.

The Secretary drew attention to the new book of paintings of 250 eucalypts by Stan Kelly, to Orchids of Australia by Nicholls, and The Last of the Lands — Handbook on Conservation recommended by Mr. Ros Garnet — the proceeds of the sale for The Australian Conservation Foundation.

Wild Flower Christmas Cards for the Aborigines Advancement League were on sale at 5c each.

Mr. T. Sault announced a ramble in the Cape Schanck area on 14th December.

Nature Notes and Exhibits

Mr. A. J. Swaby: brought a collection of native plants in flower.

Mr. A. Morrison: Blue Asbestos from Wittenoom (crocidolite) and Tiger Eye, i.e. altered crocidolite from Wittenoom.

Mr. I. Morrison: *Laxmannia sessiliflora* — a little nodding lily growing in a pot. From its stems a number of proplike growths go straight to the ground.

Mrs. Bennett: *Pterostylis nutans* kept two months in a glass with soil, forming bulbs.

Mrs. North: *Cladonia maculenta.*

Mr. Ros Garnet: Austral broom rape (*Orobanche minus*) a rarely seen parasite growing fortuitously with *Calostemma luteum* in a pot in a suburban glass house.

Also a rare orchid — scaly greenhood (*Pterostylis squamata*) growing with *Chiloglottis trapeziformis* in a pot. This greenhood came from Cootamundra, but it is also found in the Warby Range and Rainbow.

Mr. D. McInnes showed two kinds of Colonial rotifers and two kinds of hydroids under microscopes. The specimens came from the water near the Ibis rookery at Coolart.

Mrs. Taylor announced that the Quarterly Meeting of the National Parks Association will be held on 26 November, the subject being the Proposed Alpine National Park.

Mr. D. Lee spoke of his idea of making a survey in depth, of areas around Melbourne, investigating plants, insects, birds, etc. It would need about 40 people in four teams each with from six to 12. One team for north of Melbourne, another west, another east, and a fourth coastal. The bird observers and fauna survey groups are working already, but more work should be done in the field.

Mr. Garnet said that the club could do something to help the M. & M.B.W. which is planning an area around Melbourne on a 30-mile radius and are asking for information about flora and fauna, particularly in the Yarra Valley. The information is to be filed for reference.

Mr. Lewis drew attention to the proposal to bulldoze the last natural area in Sandringham for a car park for over 250 cars. Mr. Baines proposed a motion, seconded by Mr. Lewis that the Secretary write a letter of protest to the Sandringham Council against the scheme for the destruction of the foreshore at Black Rock. The motion was carried.

Marine Biology and Entamology Reports

6 October 1969

Mr. R. Condron chaired the meeting which was attended by 14 members.

Mr. D. McInnes and Mr. R. Condron reported on the F.W.C.V. Nature Show held in September last with special reference to the insect, shell and fish sections.

Mrs. Z. Lee showed colour transparencies of Heron Island marine forms, insects and mudibranches.

Mr. D. Long showed specimens of slugs. He reminded members that in 1930 Gabriel recorded European species introduced into Australia. Mr. Long showed four types; some he brought from Mr. Beaumont's property at Berwick.

Mr. D. McInnes showed under his microscope a flagellate which he identified as *Sphaerella;* this species had two flagella; a transparent larica, and varied in colour from green to red. Mr McInnes also reported that he saw a green scum at Seaford beach; this showed biflagellate moving forms; when conditions became adverse these moving forms slow down, pull themselves away from the flagella, and move like an amoeba, but one end projects and the rest of the animal flows into the projection, all forms pointing the same way.

Mr. Ken Strong showed combs from the leg of a spider magnified under his microscope.

Mr. R. Condron brought a stick insect, which at the last meeting was immature, but shows now the winged form, also the old shed skin; also a pupa and larva of the butterfly *Ogyris abrota* taken at Bulleen, which he took from a gum tree with mistletoe and attendant ants. He showed a specie of Victorian Hairstreak butterfly pupa which Mr. Condron said was rare. This was taken from under the bark of a gum tree.

Mr. McInnes showed some sea shells from Rottnest Island and Frenchmans Bay, W.A.

4 November 1969

The meeting was chaired by Mr. R. Condron, 20 members being in attendance.

Guest speaker for the evening was Mr. A. Gilmour, Senior Marine Biologist, Fisheries and Wildlife Department, his subject being "Pollution in Westernport Bay". Mr. Gilmour described what had occurred in other parts of the world and what preventive measures could be taken to offset occurrences here. In the next few years heavy industrialization is going to take place on the shores of Westernport Bay. Mr. Gilmour suggested that we could learn from overseas experience, and measures were being taken in this more toxic. This talk was illustrated with colour transparencies of different apparatus used in obtaining samples from the sea floor. Members found this talk of great interest, and at its conclusion many questions were asked. A vote of thanks to Mr. Gilmour was moved by Mr. T. Kelly.

Exhibits

Miss Jenny Forse showed a series of black and white photos of bull ants, and gave a short talk on their habits.

Mr. D. McInnes reported that "Water Bears" (Tardigrades) were appearing in his pond again.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 8 December—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.

2. Correspondence.

3. Subject for the evening—"West Australia". Club excursion August 1969.

4. Election of new members.

Ordinary

Mrs. Vyrall Fritze, 10 Rix Street, Glen Iris, 3146. (Interest—Botany.)

Mr. David C. Long, 68 Abbeygate Street, Oakleigh, 3166.

Miss Kathlene N. Roberts, 17 Oak Avenue, Elsternwick, 3185

5. General Business.

6. Nature Notes and Exhibits.

Monday, 12 January—Members' Night. (To be arranged.)

GROUP MEETINGS

Thursday, 11 December—Botany Group Meeting.

There will be no other Group Meeting held between the December and January General Meetings, according to advice received.

F.N.C.V. EXCURSIONS

Sunday, 14 December—A Nature Ramble will be held along the Ocean Reserve between Cape Schanck and Rye Back Beach. Those wishing to attend, contact either B. Cooper, 29 7379; T. Sault, 80 2571.

Friday, 26 December to Sunday, 4 January—Mt. Beauty with day excursions to Bogong High Plains, Mt. Hotham and other places of interest. Coach leaves Flinders St., outside Gas and Fuel Corp. at 9 a.m. on Friday. Bring a picnic lunch. (See other details in November *Vict. Nat.*).

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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His Excellency Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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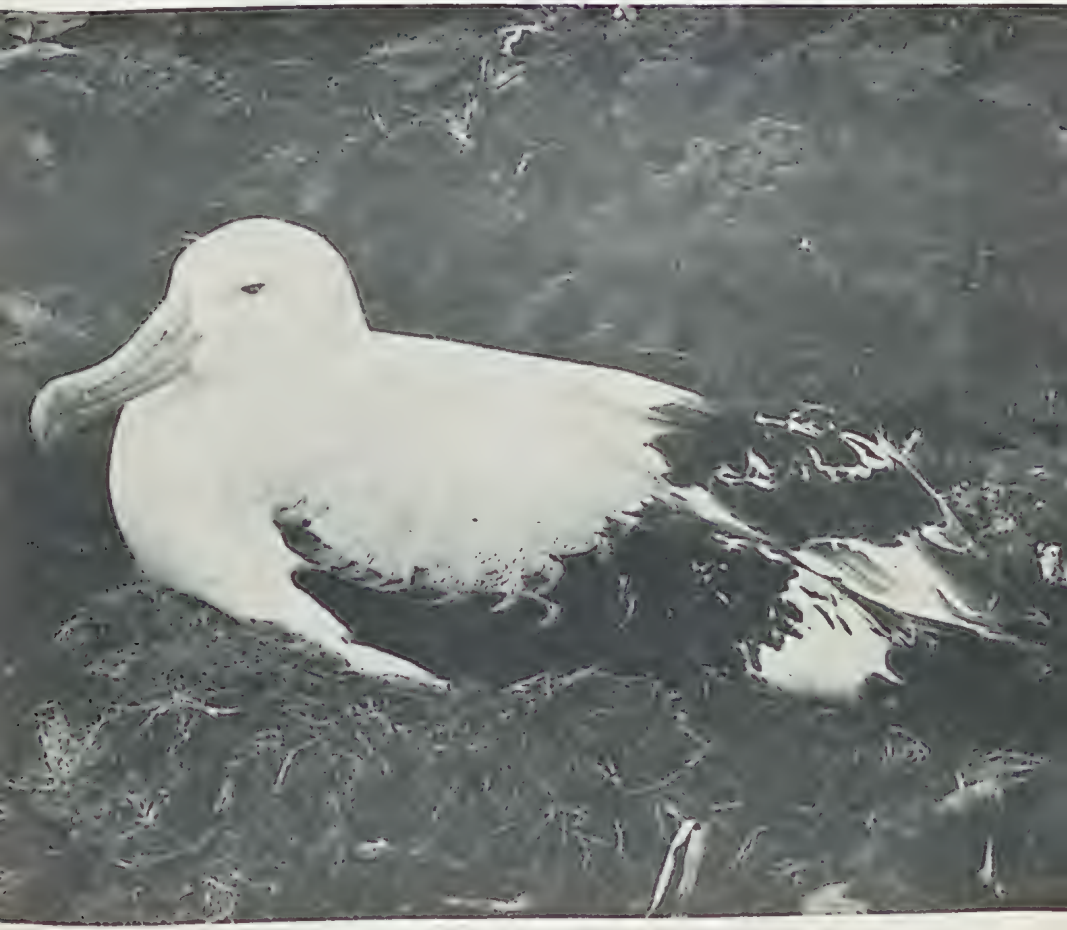

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Female Wandering Albatross *Diomedea exulans* incubating at Half Moon Bay, Macquarie Island, 1965.
ANARE photo by Ken G. Simpson.

Notes on the Aborigines of the Stawell District*

By ALDO MASSOLA†

The most noteworthy physical feature of the Town of Stawell is Big Hill, rising as it does more than 200 feet above the township. The hill is rich in gold mining history, for it was there that the "Reefs", which contributed so largely to the 70,000 oz. average yearly gold output of the district was first discovered.

History relates that prior to this discovery the locality was known as Pleasant Creek, and that it formed part of the Congongella selection, first occupied by John Allen in 1841. This pioneer sold to a Dr. Blundell in 1844, and it was one of his shepherds, William McLaughlan, who in May 1853 first found gold at Pleasant Creek.

Further back in time the district was traversed by bands of Aborigines during their seasonal movements between the camps on the Wimmera River and the rich hunting grounds on the foothills of the Grampians, or when on their way to the ceremonies which must have been performed at the Black Range.

Big Hill must have then been an important landmark. Its native name was *Kobram*, meaning Head, but signifying Hill, Elevation, and it no doubt enabled the Aborigines to correctly choose their direction. It is doubtful, however, that they would have camped in its vicinity, unless by necessity. This was because "water was scarce and what was available was anything but good . . . and the country was covered by timber of little use for anything else but firewood and dwarf scrub of no value", as is described in the 1947 official Home to Stawell publication. Under those conditions the natives would find hunting difficult, and it is even probable that the district was regarded as a no-man's-land, and that it was a boundary between two groups of tribes.

The Black Range, which they called *Burrong*, and which strangely enough means Dark, Black, was also a boundary. In the case of this range, however, it seems that it was periodically visited by the tribes from the north, at least for the performance of certain religious ceremonies. This fact is evidenced by Bunjil's Cave, where there is the only known representation of Bunjil, the Great Man of many of the Victorian tribes. The locality must have belonged to, and the figure of Bunjil must have been painted by, members of the northern group, since the people of the south believed in another Great Man, or at least had another name for the same one. Also the art style of Bunjil's rendition differs greatly from that of all other known Grampian paintings, and it must therefore be assigned to a different art tradition.

There were probably other mythological features in and around the Black Range. That singular group of rocks known as the Sister Rocks, time weathered and impressive, until their stark and gaunt forms were made to look like Piccadilly Circus by vandals, could not have escaped the Aborigines' notice; nor could have Pan Rock, which dominates the flank of the range and is credited with reflecting the moon's light by an ethereal glow said to be visible for a distance of 30 miles. Unfortunately any legend or tradition connected with these features has been irrevocably lost.

* These notes formed part of a lecture delivered before the Stawell Historical Society and the Stawell Field Naturalists' Club on 20/8/69.

† 4/18 Wolseley Street, Mont Albert, 3127

On the Black Range, water was no problem; there are still dozens of springs scattered through the hills. One, on the eastern base of the range, was known to the natives as *Mit-cat-catchin*. I cannot work out the meaning of Mit-cat, but the second part of the name, *catchin*, is generic for "spring of water". It would be difficult to pin point this spring, since there are three large ones on the eastern base of the range — Fisher's, Ludwig's and McLean's — any one of which could well be Mit-cat.

Water was also available from two rock wells, one situated close to the summit of Flag Staff hill and the other near View Rock, on the eastern slopes of the range. They are both good examples of those natural reservoirs sometimes found in granite country. Impurities in the rock were softened and washed away by Nature, and the waterholding hollow thus formed was deepened by the ever observant Aborigines. Often, as in these two cases, the hole became the mouth of a vast amount of water collected underground, the pressure of which causes it to rise to the opening in the rock. Aborigines were in the habit of keeping the mouth of these rock wells covered with a flat stone to prevent leaves and dirt, and animals, from falling in and thus polluting the water.

The names of most of the tribal groups around Stawell are known. To the north, the Wimmera River at about Glenorchy (*Djarrah*, a job, work) was the home of the *Murra-murra-barap*. Their nearest neighbours were the *Djappuninyou*, of the Richardson River, whose headquarters seem to have been on the site of Carr's Plains homestead. There was a large waterhole on the river close by, which, it has been recorded, they called *Engottenenurmwurm*, a name that to me does not even sound Aboriginal, except that the ending *Wurm* does mean Shelter, therefore denoting a camping place. This large hole, said to have been about 20 feet deep, is now silted up through the building of a dam further down the river.

The Black Range from Big Hill, Stawell.

photo: Author

Both of these groups belonged to the *Muk-jarawaint,* one of the *Wotjobaluk* tribes of the Wimmera and Mallee, and both certainly attended the great tribal gatherings at Lake Buloke at the end of the Richardson and Avon Rivers, and at Lake Wirrengren, at the end of the Wimmera River system.

South and south-west of Kobram (Big Hill), the country was well watered and game was plentiful. Lake Lonsdale (*Djakil,* Pelican), Lake Fyans (*Martang,* the Hollow), Hall's Gap, and the watershed of Mt. William Creek belonged to the *Knindowurong,* a group of people which I find difficult to place within the Wotjobaluk, as is claimed by some writers. The suffix *Wurong,* Lip, i.e. Speech, is common amongst the Western District tribes, and because of this I would make the Knindowurong a group of the *Tjapwurong* tribe, of which the next group to the east, centred at about Moyston, (*Jaraughi-djakil,* Pelican's Place) was the *Nutcheyong.* The Tjapwurong belonged to the *Mara* group of tribes.

There seems little doubt, however, that perfect amity existed between the northern and the southern people. It is even most probable that they traditionally exchanged sisters for wives, and that the northern people did take part at the great tribal gatherings of the southern tribes at Lake Bolac (*Boluk,* Swamp, and by anology Bullfrogs) during the eel season, and that they were frequent visitors at the large campsites on the sand cliffs on the northern shore and on the Sand Bar of Lake Lonsdale. Possibly there, they exchanged the produce and manufactures of their own country for stone axe-blanks which the Knindowurong quarried from the greenstone outcrops occurring amongst sandstone on the south-east and south-west flanks of Mt. Dryden, where there are accumulations of chips and flakes half-buried in the grass and soil, close to the protruding masses of greenstone, denoting where the axe-blanks were shaped. The Knindowurong also quarried this mineral (diabase) from another, but smaller outcrop, on the late Mr. Hately's property, near Juluka.

Mt. Dryden (centre) from Lake Lonsdale campsite.

Grampians are to the right.

photo: Author

The way of life and the customs and beliefs of all these groups differed but slightly from that of the other tribes of south-west Victoria, any difference being dictated by local conditions of food and terrain, and not by mentality or race.

All these tribes were divided into two intermarrying classes and counted descent through the mother. A man did not generally have more than one wife, and she had to be from the opposite class to himself and preferably not from the same locality as his mother. No one had prior access to the wife, and strict fidelity was expected from her; nor was she ever lent to friends or visitors as was done amongst certain other tribes.

When deemed old enough the boys of the tribe were initiated, which meant that they were taken into the bush by some of the men and made to witness a number of ceremonies during which the earthly activities of the ancestral or totemic spirits and the traditions of the tribe were explained. The boys had also to submit to the painful rite of depilation, during which every hair from the boys' face and body was plucked. The ceremonies terminated with a "smoking" over a fire made with green leaves. The boys were then ready to sit at the men's councils, where as yet, and for some time to come, they were not allowed to speak, only to listen and learn.

The dead were either buried, cremated, exposed on a rough platform constructed on a tree, or secreted in hollow trees. Their religious beliefs centred around a good spirit called Bunjil (Pirn-mehial by the southern tribes) who had made the earth and all upon it, and caused certain spirits to punish evil doers. When a man died his soul (*Kol-kon*) went to a happy land beyond the sky which was never short of water and where food was plentiful, and his spirit (*Gulkan-gulkan*) went to the totem centre, from which he looked out for a passing woman, whom he would enter, and having lodged in her womb was reincarnated.

The Aborigines had devised a system of life eminently suited to the environment. Their weapons and uten-

Native diabase quarry on S.-W. flank of Mt. Dryden.

photo: Author

sils were ingeniously made from available materials, such as stone, wood, reeds, and animal fur and bone. All that nature provided was utilized. Food was plentiful and varied; seeds and edible roots were collected and animals were speared, netted and trapped.

One of the few men who wrote of the Aborigines of the early period was C. B. Hall, of Hall's Gap. In letters from Victorian Pioneers he relates that he saw many signs of Aboriginal industry, and he remarked upon the numerous fish weirs made with sod banks extending across the shallows of the rivers, with apertures at intervals, at which were placed long, circular reed baskets, shaped like huge stockings, into which the fish piled. Heaps of mussel shells, remains of meals were abundant on the edges of the swamps, and old deserted mia-mias were a common sight. Native tracks were clearly defined. One, about 15 miles north of Mt. William led to the sources of the Glenelg River. Further south many others were in evidence, denoting that the Grampians were crossed in all directions.

However, as happened in all other districts, the coming of the white man disrupted the traditional way of life. The white man occupied the most advantageous positions to build his huts; his sheep and cattle foraged upon the edible roots which were the main stay of the tribes; the kangaroos and other native game were shot because it was believed that they competed with the sheep for grass; the water holes were taken over, and the sacred grounds were not respected.

The tribes, who at first appeared to have accepted the coming of the white man, became troublesome and soon every station had some tragic tale to tell; hut keepers murdered, utensils and rations stolen, cattle speared or driven off, and sheep slaughtered. But no settler admitted to the indiscriminate murdering of whole groups of men, women and children, or to the assaults perpetuated upon the persons of the unfortunate native women, many of whom were kept in a state of slavery.

Eventually the Aborigines accepted the inevitable. With their tribal territory and their tribal organization gone with most of their elders and able bodied men dead, with their women only giving birth to half castes; they gave up the struggle. Already by the mid-1850s many groups had become extinct, and the sad remnants of others spent their time pitifully wandering from station to town, often looking for bread and being given rum instead, for no better reason than for being amused at their drunken antics.

By 1863 the entire native population of the Richardson River, Lake Buloke, and Morton Plains was recorded at 52 men, women and children. In 1866 the last of the Fiery Creek group, Jimmy Ware, died, and the total remnants of the Mt. Sturgeon, Hopkins River, and Mt. Cole tribes were counted at 36 men, women and children. In that year remnants of tribes, from far and wide, amounting to 30 men and 26 women, gathered at Mt. Cole for a last corroboree. In reporting the event, the Ararat and Pleasant Creek Advertiser states that:

> . . . somehow grog was supplied to them, and the friendly dance finished in a most discourteous distribution of blows and a free use of waddies. The assembled parties separated all the worse for their failure.

However, a second attempt at the corroboree was made. King Koonawarn and his consort, "Granny", accompanied by 7 or 8 retainers arrived at Ararat from Mortlake, on their way to either the Hopkins River or Opossum Gully, where 100 Aborigines

were expected to congregate. Unfortunately I cannot find any record that the corroboree was held. If it was, this would certainly be the last general gathering of the Western District tribes. King Koonawarn, or to give him his full name, Kaawirn Koonawarn, Hissing Swan, was one of the main informants of James Dawson, the only white man who took the trouble to record the way of life of the south-western tribes of Victoria.

Pathos is sometimes clearly seen in these early accounts. Such is the case of Peter, a powerful and fearless Aboriginal of the Moyston group. When under the influence he was feared by the people of that town; and the streets were cleared when he appeared. Four years of dissipation, however, reduced him from an athlete to a broken man, skulking about for drinks, shorn alike of strength and courage, and only concerned with evading the police.

Sensationalism, too, is occasionally met in the old records; but fortunately at least in the Ararat and Pleasant Creek Advertiser, this type of journalism is not frequent. In the 26 March, 1867 issue the following appears:

> A few days since, a party of Wimmera Aborigines, fully equipped and in war costume descended upon the Richardson tribe at Carr's Plains and stole a beautiful lubra. The Wimmera coolie is a handsome man, but the Richardson tribe will, in accordance with immemorial custom, try to rescue the dusky one. Though not at all romantic, it is possible that a bottle of P.B. will settle the dispute.

The following letter to the Editor of the newspaper, which appeared in the 2 April issue, precludes any comments on my part as to the possibility of the above happening in 1867. The letter was from Holford H. Wettenhall, owner of Carr's Plains, of whom it may be said that he was one of the few settlers to treat the Aborigines like human beings, and to befriend them. The letter reads:

Johnny, "King" of Buninyong.
Reproduced *photo.* Author

> Your Glenorchy Correspondent seems to have a very romantic imagination, for in your issue of the 26th inst. I see an account of the Wimmera blacks having stolen a young and beautiful lubra from this place. Such, I beg to say, is completely erroneous. A few of the Wimmera blacks were here, and stayed several days, and had a corroboree with the Richardson ones and then returned. King Johny taking a niece with him to visit an aged relative, and is to bring her back shortly. A few only of the Richardson tribe did not want her to go, but no theft was attempted. By inserting these few lines you will much oblige the blacks and myself.

King Johny, who was the principal head man of the Lake Buloke group, died on 29 January, 1883 and was buried at the Donald cemetery. He therefore outlived by many years his Mt. Cole counterpart, King William, who died at Beaufort on 9 January, 1869.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor.

Those Glands on Wattles

Mr. A. J. Swaby sends on this report made in response to his earlier notes on wattles, *Vict. Nat.* **86** (7) (8).

Mr. C. Cane, Maffra, is an experienced keeper of bees and careful observer. He reports that bees in east Victoria where Sunshine Wattle abounds, collect the exudation from the glands and can turn it into honey. The eastern apiarists depend on that when growth is active.

That calls for closer notice in other localities. Are metropolitan bees unsophisticated?

Someone in wattle country may be interested in continued study of the relations between the plants, ants and bees. Does the sticky substance on upper leaves (phyllodes) of Varnish Wattle come from glands? Is it attractive to insects?

Wombat Note

Mrs. Ellen Lyndon sent in the following note which may prompt a reply.

A very sick and mangy wombat was seen beside the Promontory road through Yanakie Run on June 4th, soon after midday. The animal appeared to be quite blind with eyelids closed and almost cemented together. It was in very poor condition, its skin hanging in loose bald folds. It allowed itself to be stroked and discussed but when startled proved to be still fairly nimble and determined. In its efforts to climb up the road bank it fell helplessly and rolled over and over down the slope. However, it eventually climbed over and crossed the roadway as if heading in a definite direction. It is probably starving to death and it would have been a kindness to put it out of its misery. It is not unusual for mange to sweep through the fox population and leave weak and dying animals, but it is news to me that wombats can be similarly affected.

Two Ants

By A. J. SWABY

On the Black Range, western Grampians, we frequently caused excitement among ants. They were a little smaller than the red meat ants that form large mounds and worn tracks. But they were black and did not form large colonies.

The most interesting feature was a change of colour on the hind-body when disturbed. Just as if two segments were parting a patch of yellow-grey showed up. Someone with a microscope may complete the story.

In 1962, a wet year, we found small black ants in nests on sedges just above water level in a swamp between Sheet of Water and Forest Lodge, Grampians.

How did they know the flood was coming and what the height would be? Or did they move the nests up as the water rose?

Several times since, search has not revealed any of the abovementioned ants.

Notes on Australian Pigmy-possums (*Cercartetus*, Phalangeridae, Marsupialia)

By N. A. WAKEFIELD*

Abstract

Note is made of recently proposed revisions involving family and ordinal taxonomy of marsupials. Distributional data and questions of subspecific taxonomy of species of *Cercartetus* are discussed. Five nipples and a litter of five are recorded for *C. nanus*. Details are given of observations of captive specimens of *Cercartetus*, which indicate that dormancy is correlated with rainfall and availability of food, and it is suggested that this demonstrates an adaptive advantage of dormancy.

The validity of *Cercartetus* Gloger as the generic name for four species of Australian pigmy-possums was discussed previously in this journal (Wakefield, 1963).

Classification

In a classification of marsupials, based on serological studies, Kirsch (1968) proposes to exclude *Cercartetus* and certain other genera from the family Phalangeridae and to place them in the family Burramyidae. The title of this paper has retained the broader application of the name Phalangeridae.

In a classification proposed by Ride (1964), the name Marsupialia is given superordinal status, several orders of marsupials are recognized, and the family Phalangeridae is placed in the order Diprotodonta.

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Distributional Data

Cercartetus nanus

It was noted that O'Reilly (1940) mentioned the finding of a "dormouse possum" in the Macpherson Ranges, S.E. Queensland, and an enquiry to the Queensland Museum brought the following reply (A. Bartholomai, letter 21/5/1965):

> The specimen mentioned in Bernard O'Reilly's *Green Mountains* has been located, labelled *Dromicia unicolor* and registered J5861. It is a female spirit specimen, and was obtained from Robert's Plateau, Lamington National Park, S.E. Q., donated by M. O'Reilly, on 7/1/1936.

The specimen was examined and its identity is *Cercartetus nanus*.

There is now a second example in the Queensland Museum (reg. no. J13580) from the same area. It was sent to the museum by David Fleay, and the date recorded, 9/2/1966, evidently refers to the registration and not to the original discovery. The specimen is a young adult female, with the M^3s not fully erupted. The deeply bifid P^4s establish the identity as *Cercartetus nanus*, although it had been reported in a newspaper (*The Courier Mail*, Brisbane, page 8, 18/1/1966) as being *Cercartetus caudatus*, the Long-tailed Pigmy-possum of N.E. Queensland.

The previously recognized most northerly occurrence of *C. nanus* was in the Newcastle area of New South Wales (Wakefield, 1963).

Green (1969) provides data of the occurrence of *C. nanus* on Flinders Island, Bass Strait.

Cercartetus concinnus

Bolam (1923) reports the finding of a specimen of *C. concinnus* at Fisher, about 50 miles west of Ooldea in the far south-west of South Australia. The locality is towards the middle of the 600-mile gap between the known ranges of the western and eastern races of the species (Wakefield, 1963), and it is in the mulga-saltbush vegetational association (ref. Wood and Williams, 1960), in which the species is not otherwise recorded.

Lundelius (1957) records remains of *C. concinnus,* of presumably Recent geological age, from Murraelellevan Cave, in the far south-east of Western Australia, approximately in the centre of the distributional gap between the two races. The cave is at about the limit of the vegetational formation identified by Wood and Williams (*loc. cit.*) as semi-arid mallee, a normal habitat of the species. The age of the cave remains has not been determined.

Cercartetus lepidus

A prepared skin and skull of *C. lepidus* was presented to the South Australian Museum (reg. no. M6338), and the donor reported that the specimen had been found, alive, on Kangaroo Island, South Australia (Aitken, 1967).

The local climate and the sclerophyll mallee vegetational formation of that island (ref. Wood and Williams, *loc. cit.*), make it extremely unlikely that an indigenous population of the species occurs there.

Cranial characters and teeth of M6338 have been measured and compared statistically with those of a series of modern Tasmanian specimens of *C. lepidus.* Ten probability values, obtained from T tests for eight linear dimensions and two proportions, all lay in the range 0.21 to 0.95. This suggests strongly that the Kangaroo Island specimen belongs to the Tasmanian population.

Accidental transport of pigmy-possums

It has been reported that two specimens of *Cercartetus nanus* were inadvertently taken away, in packed clothing, from a seaside cottage at Tamboon Inlet, eastern Victoria, and that specimens of *C. concinnus* have been found secreted in farm machinery both in western Victoria and lower South Australia (Wakefield, 1963).

Green (1969) records the accidental transport of a specimen of *C. nanus* from Flinders Island in Bass Strait to Tasmania. It was found in a torpid condition when a recently shipped bag of wool was opened in a Launceston wool store.

Episodes of this kind indicate the possibility of accidental transport of a specimen or family of the Tasmanian *C. lepidus* to Kangaroo Island, thus providing the South Australian Museum specimen; and a similar explanation could apply to Bolam's specimen of *C. concinnus* at Fisher.

Subspecific Taxonomy

Cercartetus nanus

Wakefield (1963) suggested that a single mainland race, *C. nanus unicolor* (Krefft), should be recognized, as distinct from the Tasmanian race, *C. nanus nanus* (Desmarest). This was based mainly on the consideration of geographical distribution.

Subsequent craniometric study of subfossil and modern series has demonstrated (a) that the mainland population is bimodal as regards size, with specimens from S.W., C. and N.E. Victoria smaller than those from E. Victoria and E. New South Wales, and (b) that the locally available Tasmanian cranial specimens (four in number) are insufficient to demon-

strate difference from or affinity with either of the mainland populations.

A suitably large series of Tasmanian specimens, and further study, are needed to resolve the matter.

Cercartetus concinnus

If there is a continuous distribution of this species from South Australia to Western Australia, as is suggested by Bolam's Fisher specimen (see above), or if further cave deposit data show that such distribution did occur in Recent times, then the distinguishing of the eastern Australian population as *C. concinnus minor* (Wakefield, 1963) must be questioned. In any case, proper statistical comparisons of adequate series from the two populations should be made.

Cercartetus lepidus

Measurements of the fossil specimens from Wombeyan Caves, New South Wales, and of the subfossil material from the Pyramids Cave, E. Victoria (ref. Wakefield, 1963), have not demonstrated any significant difference between this Australian Pleistocene population and the modern Tasmanian one. The Pleistocene material is too fragmentary for satisfactory diagnosis.

C. nanus with Litter of Five

On September 17, 1963, a female of *C. nanus* was found by D. Pepper near Mount Drummond, 15 miles west of Stawell, W. Victoria. With this species the normal number of nipples is four (Wakefield, 1963), but this specimen had a litter of five half-grown joeys. Examination of the pouch showed that she had five nipples.

Apart from the supernumerary nipple, this observation is of interest because the mother had produced more than the normal four pouch young. Small dasyurids (*Antechinus* spp. and others) have been found to have about twice as many embryos *in utero* as there are nipples for their accommodation (P. Woolley, pers. comm.). This over-production of young is apparently an adaptation to offset possible loss of new-born individuals which do not succeed in reaching the nipple area. Evidently this applies also to *Cercartetus nanus,* and it may be general among small marsupials.

Dormancy

Introduction

Hickman and Hickman (1960) record observations of dormancy made over a 12-month period with captive specimens of *Cercartetus nanus* and *C. lepidus.* Two females of each species were involved, and these results were obtained:

There was no prolonged hibernation; the longest period of dormancy was 12 days for *C. nanus* and 6 days for *C. lepidus.*

During full dormancy (also referred to as torpor), body temperature was about equal to air temperature, and, during arousal from torpor, that of *C. nanus* rose 31°C in 3 hours and that of *C. lepidus* 32°C in 2 hours 40 minutes.

Activity tended to be longer and dormancy shorter during the half-year September-February, and the reverse applied to the period March-August.

At temperatures between about 4°C and 18°C no direct correlation was apparent between temperature and the activity or dormancy. *C. nanus* was sometimes active at temperatures less than 2°C, but *C. lepidus* was not active when temperature was below 4°C. *C. nanus* was not dormant at temperatures above 18°C, and for the two specimens of *C. lepidus* the limit was 19°C and 15°C respectively.

There were individual differences in each species both in total number of

days of activity and in maximum duration of periods of activity.

Bartholomew and Hudson (1962) provide results of study of the physiology of *Cercartetus nanus*, including data of its metabolism during dormancy.

As well as reduction of body temperature during dormancy, breathing rate, oxygen consumption and heart rate were all much less. These authors remarked that, in laboratory conditions, dormancy was independent of season, time of day, environmental temperature, or availability of food. They found that any isolated and undisturbed animal sooner or later became dormant, that duration of dormancy was irregular, that dormancy tended to be most common during the early morning hours, and that, at temperatures below 15°C, some animals remained dormant for several days.

Food Availability and Dormancy

In winter 1962, at Noble Park, Victoria, observations were made of the dormancy, under various conditions, of three specimens of *Cercartetus concinnus* from the vicinity of the Little Desert, western Victoria. An adult male and an adult female (referred to as M1 and F1) were housed together in Cage 1 from June 2 to August 6, and another adult male (M2) was kept in Cage 2 from July 4 until August 6.

Food was supplied in the form of a honey-water mixture and cooked cornmeal-sugar-egg-milk custard. At certain times, all food was withheld for periods of 2 to 4 days.

Nest compartments associated with the cages had lids which allowed observation of the occupants with a minimum of disturbance. Record was kept of periods of activity and of dormancy, as far as these could be determined by frequent inspection. Environmental temperature was recorded when inspection was made. Subsequently, rainfall records were obtained for weather stations at Springvale and Dandenong, and the daily falls were averaged to provide approximate data for Noble Park, which is situated between the two stations.

Table 1 shows details, for the 56 days, of availability of food in each box, periods of dormancy and activity of each specimen, and rainfall.

Specimen F1 provided an activity score totalling 39 days out of the 56. This was evidently excessive, for she remained in poor condition and eventually died. She was dormant for 8½ of the 42 days (= 20%) when food was available, and for 8½ of the 14 days (= 61%) when there was no food.

Specimen M1 was active for a total of 12½ days of the 56. He remained in good condition, with considerable accumulation of subcutaneous fat. He was dormant for 31½ days (= 75%) of the periods when food was available, and for 12 days (= 86%) of the periods when it was not.

Specimen M2 was active for an aggregate of only 3 days of the 34 days of observation in his case. His dormancy amounted to 26 of the 29 days (= 90%) when food was available, and for the whole of the 5-day period when it was not.

When combined, these three sets of data indicate dormancy for 58% of the periods when food was available to the respective individuals, and for 77% of the periods when food was not available. A similar analysis for the 38 days from June 12 to July 19 (to avoid complication with the very rainy phase of late July and early August), provides figures of 40% dormancy when food was available and 70% dormancy when it was not.

TABLE 1

Record of dormancy of *Cercartetus concinnus* in relation to food availability and rainfall.

Date (1962)	Box 1			Rainfall	Box 2	
	Food	F1	M1		Food	M2
June						
12		A	(D)			
13		A	D	18		
14		A	D	6		
15	N	A	D-A	1		
16	N	A	A	14		
17		A	A	9		
18		A	A			
19	N	A	D	16		
20	N	A	D-A	3		
21	N	D-A	D	3		
22		A	D			
23		A	D			
24		A	D	32		
25		A	D	23		
26		A	D			
27		A	D			
28		D-A	D-A			
29		A	A	27		
30		A	A	1		
July						
1	N	A-D	D	2		
2	N	D-A	D			
3		A	D	13		
4		A	D	2		D
5		A	D-A			A
6		A	A			A
7		A	A			D
8		A	D	2		D
9		A	D-A		N	D
July						
10		A	D-A		N	D
11	N	D	D		N	D
12	N	D	D		N	D
13	N	D	D		N	D
14		A	(D)	4		D
15		A	D			D
16		A	A			D
17		A	A			D
18		A	D			A-D
19		A	(D)			D
20		A	D	7		D
21		A	D	17		D
22		(D)	D	5		(D)
23	N	(D)	D	127		D
24	N	D	D	55		D
25	N	D	D	3		D
26	N	D	D	21		D
27		A	(D)	1		D
28		A	D	1		D
29		A	D-A			D
30		D	D	11		D-A
31		D	D	8		D
Aug.						
1		D	D	73		(D)
2		D	D	4		D
3		D	D	19		D
4		D	D	10		D
5		D	D			D
6		A	D	3		D

Food—N indicates that none was available; otherwise it was present.

Rainfall—The record shown for each day is based on records for the 24-hour period to 9 a.m. the following day.

The state of each specimen is shown thus—A, active at each inspection for the day; D, dormant at each inspection; A-D, active at first, dormant later; D-A, dormant at first, active later; (D), dormant, but at some stage not fully torpid. (See text for key to individuals.)

Further correlation between dormancy and food availability is indicated by the fact that two periods (3 days and 2 days) of absence of food coincided with the initial stages of much longer periods of dormancy (7½ days and 5 days respectively) of specimen M1.

Rainfall and Dormancy

For days when rainfall was less than 6 points, the three specimens of *Cercartetus concinnus* produced a record of 59% dormancy and 41% activity. For days with rainfall in the 6 to 40 points range, dormancy was 63% and activity 37%. And for the three days when rainfall exceeded 50 points for a day, there was 100% dormancy.

The female *Cercartetus nanus* and her five joeys were observed from September 28 to October 18, and again from November 5 to November 9, 1963. During those times, honeywater and mealworms were continuously available to them. The environmental temperatures which were noted ranged from 46° to 68°F (9-20°C), and the possums were sometimes dormant at the higher limit. Except for a single occasion, when one individual was active and the others dormant, all six were either all active or all dormant whenever observed.

During the 21-day period, there were two phases of heavy rain: over 2 inches between 6 p.m. on September 28 and 9 a.m. on October 2, and approximately an inch from October 11 to 14. The remainder of the period was almost or quite fine. The possums were dormant throughout the first phase of rain and during almost all the second phase. They were active at all other times of inspection.

On November 5 they were found to be dormant and they remained so until about noon on November 8. This dormancy was correlated with an aggregate of approximately 70 points of rain between November 2 and 7.

The cages housing the three specimens of *C. concinnus* and the family of *C. nanus* were kept during the periods of observation in the room of a house and thus were not in direct contact with the weather. The reaction of the animals to the occurrence of rain indicates that they were sensitive to the associated humidity.

Recovery from Torpor

On each of a number of occasions when specimens of *C. concinnus* were removed from their nest boxes and taken to a heated room for purposes of photography, the period of recovery from full torpor to full activity was approximately 30 minutes. Plate 1 comprises a series of ten photographs taken during one such period of recovery from torpor.

Conclusions

A positive correlation has been demonstrated, both with *Cercartetus concinnus* and *C. nanus*, between periods of dormancy and the occurrence of rain, and, with *C. concinnus*, between dormancy and non-availability of food. It is logical that such patterns should have evolved in response to the selective advantage of energy conservation when food cannot be obtained either because it is absent or because weather conditions prevent foraging.

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PLATE 1

Cercartetus concinnus: Recovery from Torpor

The sequence of ten photographs was taken over a period of approximately 30 minutes.

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Some Species of *Asterina* from Flinders, Victoria

By A. J. DARTNALL*

SUMMARY

Asterina atyphoida H. L. Clark and *Asterina scobinata* Livingstone are recorded from Flinders, Victoria.

Hermaphrodism of the latter species is recorded and the distribution of hermaphrodite species of asterinid sea stars considered.

Introduction

Twelve nominal species of the sea star genus *Asterina* are known from Australia (H. L. Clark, 1946). Three species are found on the south-eastern corner of the continent viz. *Asterina atyphoida* H. L. Clark, 1916; *Asterina inopinata* Livingstone, 1933 and *Asterina scobinata* Livingstone, 1933.

The size of sea stars is expressed by measuring the major radius (R) and the minor radius (r). The outline shape of the animal is expressed as a ratio R:r.

Asterina atyphoida H. L. Clark, 1916
Fig. 1

Arms five, pentagonal in shape. R:r = 1.3:1. Maximum R = 12 mm. Actinal intermediate plates usually with a single short blunt spine. Colour "pale cream, yellow or light brown", (Shepherd, 1968). The single specimen collected at Flinders was pale cream with a dark grey smudge at the centre of the disc. The specimen was female and the bright orange gonads showed through the oral surface. The gonopores are orientated orally.

Range: From the South Australian Gulf to Flinders, Victoria. Also recorded from Tasmania (Dartnall, 1969).

Asterina scobinata Livingstone, 1933.
Fig. 1.

Arms five; body stellate. R:r = 2:1. Maximum R = 15 mm. Actinal intermediate plates carrying groups of fine spines. Colour pale cream or light brown.

Range: The single specimen collected from the edge of the rock reef at Flinders constitutes the first record of this species from Victoria. Until then *Asterina scobinata* was known only from Tasmania.

Remarks: *Asterina scobinata* is secretive in its habits and is found under rocks and in crevices in the lower littoral zone. The type specimens of *A.scobinata* had five pairs of small, non-calcified spots in the actinal interradial areas (Livingstone, 1933). The presence of these spots was commented upon by H. L. Clark (1946) who wrote that they could "be made out with more or less difficulty" in the specimens available to him.

Twenty-three specimens from eight localities around Tasmania and one in Victoria (fig. 2) are held in the collections of the Tasmanian Museum. Four specimens are preserved in fluid fixatives, the remainder are dried specimens. The material to hand matched the original description in all pertinent characters except that pores, not spots, are present in the interradii.

Dissection revealed that the pores are orally orientated gonopores and that the species is hermaphrodite. Examination of the gonads showed subsequent sectioning of the gonads a preponderance of female tissue, the eggs being c. 0.3 mm. in diameter.

* Keeper of Invertebrates, The Tasmanian Museum, Hobart, Tasmania.

Male tissue was confined to a small area near to the base of the gonoduct. It would appear that, as in some other species of the Asterinidae, the ova are released to the substrate and are not pelagic.

Whether the territorial hermaphrodism observed is but one facet of a sexual polymorphism is unknown. Little can be gained by temporal studies of the small amount of material available which was collected in January, March and June of different years. Difficulties of collecting and scarcity of material may prelude adequate investigation of the reproductive biology of *Asterina scobinata* for some time.

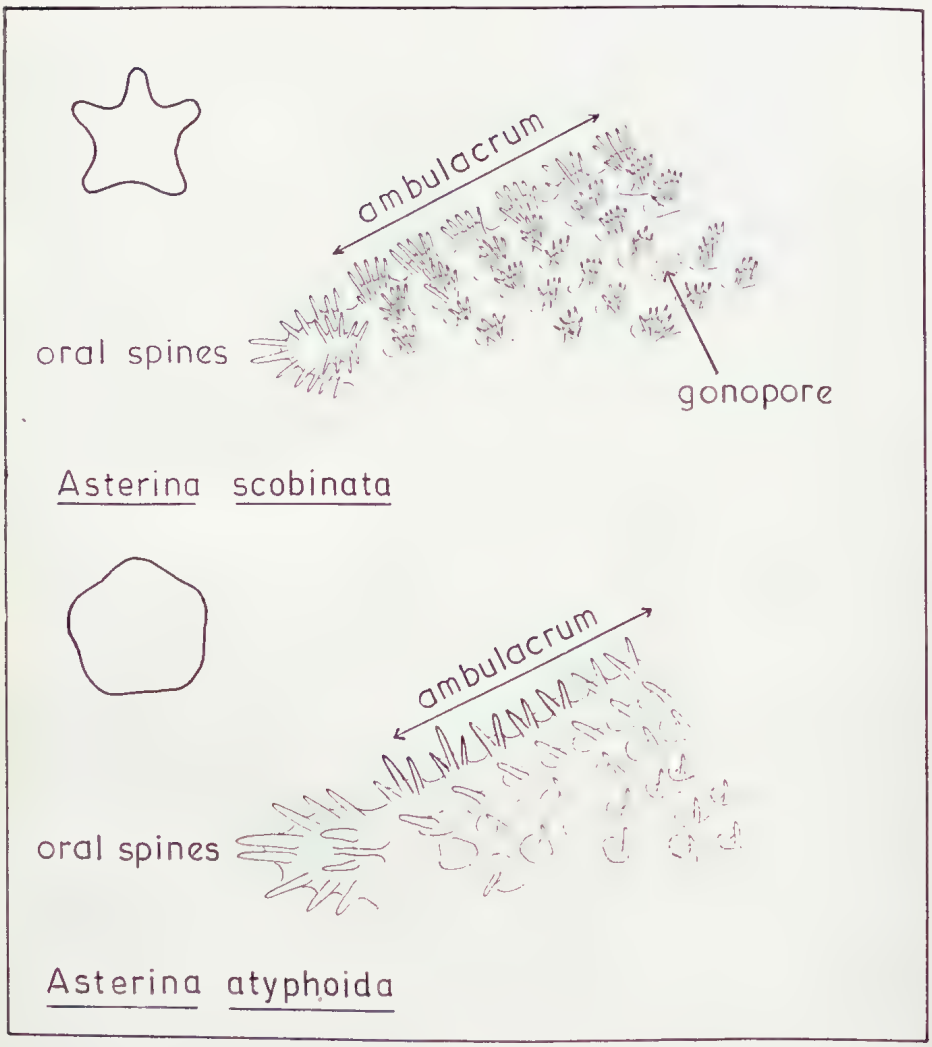

Fig. 1. Diagramatic representations of body outline and spinulation of the actinal surface in *A. scobinata* and *A. atyphoida*.

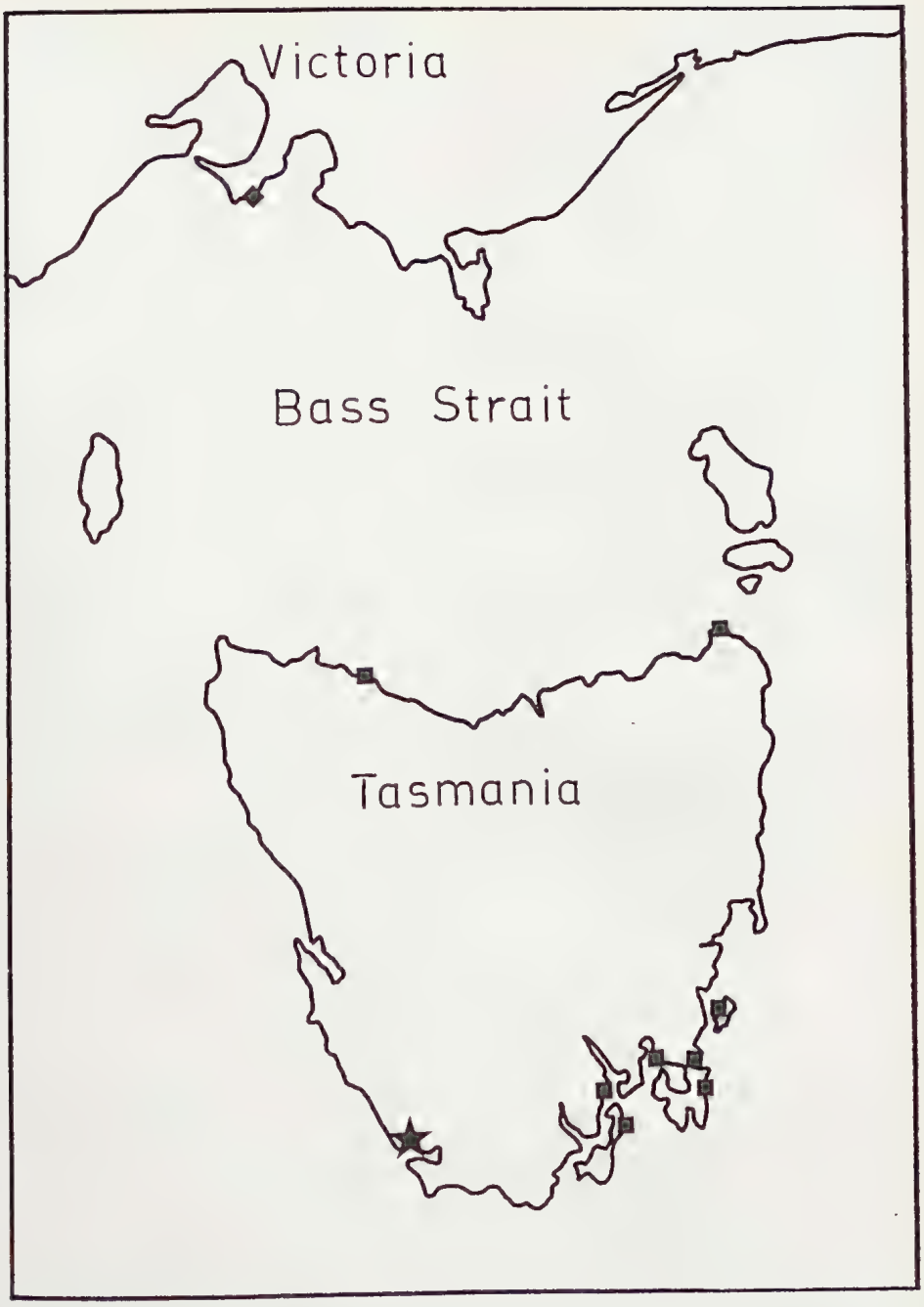

Fig. 2. Stations from which *A. scobinata* has been collected. The specimens from Port Davey, S.E. Tasmania (marked with a star) are held in the Queen Victoria Museum, Launceston, Tasmania.

Distribution of Hermaphrodite Species of Asterinidae.

Five species of the Asterinidae are known to be hermaphrodite and it is of interest to observe their distribution (fig. 3). *Asterina gibbosa* Pennant and *Asterina pancerii* Gasco are known from European waters, *Asterina batheri* Goto from Japan and *Asterina scobinata* and an hermaphrodite species of *Patiriella* are endemic to the Maugean Province of Australia. All have distributions in areas around 40° of latitude north or south. It remains to be seen if factors common to these areas could have resulted in the convergent evolution of hermaphrodite forms or whether hermaphrodism is a primitive characteristic of species pushed outwards from a rapidly speciating pool of Indo-Pacific asterinid forms.

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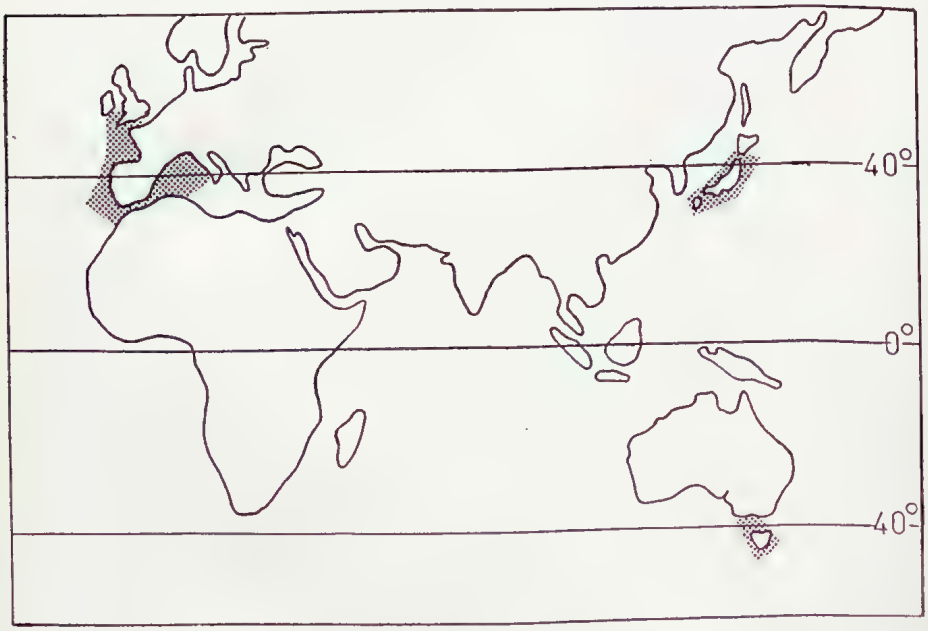

Fig. 3. Map to show distribution of hermaphrodite species of asterinid sea stars.

BOOK REVIEW

Birds of the New Zealand Shore

by BERNARD STONEHOUSE

Published by A. H. and A. W. Reed, Wellington, 1968. 12 pp. col. and b. and w. pll., and line drawings. $4.95.

Shore birds carry a special appeal for both ornithologist and general naturalist. Dr. Stonehouse has compiled his list on the basis of "shore living species which breed on the main islands of New Zealand." In brief he includes Penguins, Shags (Cormorants), Gannet, Waders, Gulls, Skuas, Terns, Herons, and Spoonbills, but not necessarily all of each group. Rare waders and also marginal species "which raid the shore from time to time" are excluded. New Zealand ornithogolists can safely be left to argue the case as to whether this or that species ought to be in or out.

As it is the book is both useful and attractive, the plates being generally excellent. The Penguin keys could be a little more precise about where crests begin, the name Egret could have been mentioned for the White Heron, it would have added perspective to have shown that some species occur as different races in Australia, e.g. Silver Gull and White Egret, and the large line drawings are not always effective. Other minor criticisms of factual matter will be found elsewhere e.g. *N.Z. Listener,* 1 Aug., 1969, p. 27, *Emu* **69** (3).

Nevertheless the book provides an introduction to the ecology of a distinctive habitat and bird community, it assists the identification of waders, and it will help Australian readers to a better acquaintance with some N.Z. birds. On a quite different level it is interesting to note the injection of the companionable style of British nature writing, e.g. herons that "pose in silence like eccentric diplomats in an embassy fishpond" and gannets that flap "their long elegant wings with an unmistakable nonchalance", that avoids anthropomorphism only by a degree of sophistication. The contributions of British ornithologists to the Australasian scene during the past ten years are both varied and unfinished.

A. R. McEvey

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

EDITOR'S NOTE

Due to a combination of personal difficulties and industrial problems, I unfortunately omitted to include in the December issue of the *Vict. Nat.*, any mention of thanks or seasonal wishes to contributors and readers. I therefore now thank 1969 contributors, and on behalf of Council, express the hope that a measure of peacefulness and rest existed within your lives over Christmas; and that your hopes and ideals are accomplished during 1970.

. . . .

Field Naturalists Club of Victoria

General Meeting, 8 December, 1969

Approximately two hundred members attended and the meeting was Chaired by Mr. T. Sault, the Vice-President.

An apology was received from the President, Mr. E. R. Allan.

The minutes of the last meeting were taken as read on the motion of Mr. J. Strong and Mr. F. Zirkler.

Three new members who are listed in the December Naturalist were elected on the Motion of Miss M. Allender and Mr. A. J. Swaby. The Chairman announced that Council had approved the spending of from $750-$1,000 on the publication of Mr. Roy Wheeler's book "Birds of the Dandenongs".

It was announced that Mr. Charles A. Gardiner who has been awarded the Natural History Medallion is very ill in hospital. It has been decided to send the Medallion to Perth for presentation to him in hospital.

The Secretary has received a letter from the Bendigo Council saying that they will support any action the Club is contemplating on getting the Whipstick made a National Park.

Copies of the Victorian National Park project for 2,000 sq. miles of the Victorian Alps were available at the meeting.

The Secretary announced that a Christmas Card has been received from Mr. and Mrs. R. Hudson in England.. Mr. Hudson was a former editor of the Naturalist and is still a member of the Club. The thanks and good wishes of the Club are extended to Mr. and Mrs. Hudson.

The Secretary had been contacted by the Bend of Islands Conservation Society regarding the unnecessary destruction of natural bushland in that area due to the overall authority of the "Proper Officer" for clearance of fire hazards. Some properties had suffered destruction by bulldozing beneath the top soil. The Secretary, Mr. D. Lee, sent a letter and a telegram to the Healesville Council in time for a meeting at which the Bend of Islands Conservation Society would be present. He has had no reply.

The subject of the evening was the "Club Excursion to Western Australia, August 1969".

Many of the members provided slides taken on the excursion and the commentary was given by Mrs. E. King who traced on a projected map the route taken. The party went by train and before reaching Adelaide got off at Bridgewater, where Mr. Bill Gasking showed the party around the Cleland Native Fauna Reserve where native animals are kept in surroundings as free and natural as possible. Pictures showed Emus with chicks, water birds and several kinds of marsupials.

En route to Perth along the Nullarbor Plain, telegraph poles harbored nests. From Perth the party went by bus to Yanchep, to Jurien Bay, then through Geraldton to Coorow, Carnama and Three Springs to Northampton and Kalbarri National Park, and the Murchison River.

From Northhampton the route was back to Geraldton and then inland to East Yuna and through Mullewa to Wongan Hills, Merredin, Hyden, Lake Grace, the Stirling Range, Poronguraps, Pallinup River, Albany, Manjimup, Pemberton, Busselton, Port Augusta, Cape Leeuwin and back to Perth — a

total of 2,250 miles by bus. From Perth the M.V. "Katameraire" took the party to Rottnest Island for the day, and on the last day in Perth, King's Park was visited before returning by train. Beautiful slides showed masses of flowers in natural gardens and on roadsides including purple Hovea, pink Calythrix, smoke bushes, rosettes of trigger plants, grass trees, golden Acacias and Synophea, red Calothamnus, blue, red, and yellow and red Leschenaultias, golden Hibbertias, cream and yellow Conostylis, lilac Hemiandra, blue-violet Thysanotus, white Stenopetalum and Stackhousia, red and yellow Catspaw—Anigosanthos, and black and yellow Kangaroo paw—Macropedia—Salmon gums made fine pictures. When the bus driver was investigating a roadside car accident outside Jurien Bay, an oncoming car put the bus out of order by puncturing the fuel tank.

The four hour wait was used in investigating the area where the magnificant red *Verticordia grandis* appeared. Outside Three Springs a talc open-cut mine was photographed. At Strawberry Bridge *Brachysema aphyllum* was first seen, and near Geraldton the famous leaning Greenough Eucalypt trees appeared. From Northhampton the Kalbarri National Park and the Ross Graham lookout over the Murchison River provided magnificent pictures of gorge and Red Bluff and native plants including Golden *Loudonia aurea,* red and green Kangaroo paw—*Anigosanthos manglesii* in masses on burnt out areas, Lamb's tail *Lachnostachys eriobotrya,* Grevilleas, Hakeas, Melaleucas, Isopogons, Petrophilas, numerous Acacias, the pine like Actinostrobus, lilac *Hibiscus huegelii,* yellow Labichea, pink Verticordia, many pink-mauve Baeckea or Scholtzia patches and bright Parakeelia near the Murchison River where Coolibah trees occurred. A *Moloch horridus* lizard was found at Kalbarn. At East Yuna after lunch under the York gums where a stumpy tail lizard co-operated with the photographers, Mr. and Miss McGauran took the party to their bush land and showed many native plants, the highlight being the scarlet Balaustion (native pomegranate). From the Mullewa area fields of yellow, pink, and white and orange everlasting types were shown.

Huge portable wheat storages dominated many inland towns in the wheat area. Masses of blue Dampiera, varying from pale blue to purple, royal Scaevola, Thomasia, Melaleucas, *Hakea bucculenta* and *H. multilineata,* wreath Leschenaultia, Gimlet gums, and a fruiting Quandong were photographed.

The celebrated Wave Rock near Hyden was shown from various angles, up, down, and sideways.

On the way to Stirling Range, flowering Mallees were common and also miles of Acacias of many species. At the foot of Bluff Knob, the bus jibbed on a hill, but was ultimately towed up by a road making machine secured by the efforts of Evelyn Jones and Anne Forbes.

The pictures of the Stirlings included *Banksia grandis* in flower and fruit, Beaufortia, Dryandras, Isopogons, Petrophilas and *Darwinia leiostyla.*

In the Porongurups, Karri and purple Hovea were prominent. Red *Banksia coccinea,* red Leschenaultia and the "Albany daisy" *Actinodium cunninghamii* made beautiful pictures, and orchids included hammer, elbow, spider, jug, donkey, cowslip, and pink fairy orchids.

At Albany pictures from Frenchman's Bay included Anthocercis (Ray flower), Xanthosia (Southern Cross).

After lunch in Mr. Fell's garden, the party went by bus to Mr. Lockharts property on an introduction from Mr. Fell. Here pictures of the pitcher plant and the brown boronia and a red Adenanthos growing in a swamp were taken. At Manjimup a small native reserve showed black swans and a nesting galah.

Near Pemberton is the famous Gloucester Karri tree with a fire watch cabin 212 ft. up. Giant Karri and Jarrah trees. *Clematis pubescens, Leucopogon verticillata,* yellow *Patersonia xanthina,* Kingia grass trees showing round knobs of flowering shoots were shown.

From Busselton were views of the old St. Mary's Church and the first train (made in Ballarat) to run in West Australia.

Other scenes were of the Margaret River Jewel Cave, the lighthouse at Cape Leeuwin where pink *Pimelea ferruginea* bloomed. Along the road were masses of coral coloured *Kennedya coccinea.*

Near Bunbury an open cut ilmenite mine was viewed, and at Dawesville on Peel Inlet three photogenic pelicans posed on a post.

White *Agonis flexuosa* in full bloom, mauve *Olearia rudis* and at a reserve outside Perth the pink Swan River myrtle were seen.

Lake Bibra, a wild fowl refuge, showed many water birds among the paper bark trees. A visit to Rottnest Island showed quokkas being fed after responding to the call of the bus horn.

Mr. Sault thanked Mrs. King for the commentary and Mr. Alan Morrison for projecting the slides.

Members showed enthusiastic appreciation.

Nature Notes

Mr. D. McInnes said that the Club excursion on Sunday, 7 December, included a visit to the 200 acre Nature Reserve from Cuthbertson's property off Grubb Road near Ocean Grove. (A note on the history and birds and plants of the reserve will be included separately.)

Mr. McInnes showed two small polychaete worms under the microscope; one a spirorbis and the other surrounded by a sandy tube. These were from Point Lonsdale. Mrs. E. Bennett brought some duck orchids (*Caleana major*) growing in a pot. They had been in flower since 11 November.

Mr. A. J. Swaby said the flowers often stay out to be pollinated by *Lissoplumpa semipunctata* and remain open if they are not. This insect does live near Mrs. Bennetts' Sandringham home.

Mr. Swaby brought garden grown native plants in flower including *Sollya fusiformis* (W.A.), *Melaleuca hypericifolia, Prostanthera lasianthos, Leptospermum ericoides, Calothamnus quadrifida, Haloragis micrantha* and also the flattened stem of *Homalocladium platycladium* from which a rare leaf came out. He also showed a large larva of a Wattle goat moth (*Xylentes d'urvillei*) the boring by which species killed a wattle tree. Mr. H. Bishop showed under a binocular microscope, a hydroid (*Claratella prolifera*) with 6 arms, each with two parts, one a suction pad to grip for locomotion, and one with stinging cells for capturing prey such as Crustaceans. Some of this material from Mr. Bishop's tank has been sent by Mrs. Jan Watson to the Emperor of Japan who is a famous marine biologist. Mr. Ros Garnet brought a fine flowering *Cymbidium canaliculatum*—an epiphyte on many kinds of host trees in Queensland, including iron bark and smooth bark Eucalypts and Casuarinas. Sugar exudes from this plant at the axils of the flower pedicels.

Miss M. Allender showed the West Australian Pitcher plant *Cephalotus follicularis* which was gathered in W.A. in 1963.

Mr. T. Sault brought *Alyxia buxifolia* (Sea box) with white perfumed flowers and berries forming.

Mr. A. Fairhall showed an unusual formation of *Calothamnus quadrifidus* with a long length of flowers growing evenly around the stem of this so called "one-sided bottle brush".

Marine Biology and Entomology Group Report, 1 December, 1969.

This Meeting was Chaired by Mr. R. Condron, 15 members being in attendance.

The Secretary announced that as usual there would be no meeting in January. Prior to the Group changing their meeting place to the National Museum early in the New Year, the Secretary is to ascertain what parking facilities for cars are available.

There will be a F.N.C.V. outing to the Sorrento area on 15 February, 1970, as there is low water at 2.22 p.m. on that day.

Mrs. Zillah Lee showed some beautiful slides taken on various F.N.C.V. trips including areas around Binna Burra, Queensland, her photography being up to its usual high standard. Mrs. Lee gave a short talk on each slide, and members thoroughly enjoyed this part of the evening.

Exhibits:—

Mr. Bishop showed a species of hydroid taken from his marine tank. He gave a short talk on this interesting little Coelenterate.

Mr. McInnes showed beetles collected in the Brisbane Ranges area by the Hawthorn Juniors on an excursion led by Mr. P. Kelly. Also a species of water boatman (back-swimmer), under a Club microscope, and gave a short talk on this. Mr. R. Condron showed some Lycaenidae family butterflies which he had bred out, also some pupae of family Hesperidae.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12 January—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—Members' Night.
4. General Business.
5. Nature Notes and Exhibits.

Monday, 9 February—"Through the Kimberleys": Mr. Alan Morrison.

F.N.C.V. Excursions

Sunday, 18 January—Cumberland Falls. The coach will leave Batman Avenue at 9.30 a.m. Bookings with the excursion secretary. Fare $2.00. Bring two meals.

Sunday, 15 February—Marine Biology Excursion to Sorrento area.

GROUP MEETINGS

(8 p.m. at National Hebarium unless otherwise stated)

Wednesday, 21 January—Microscopical Group.

Monday, 2 February—Entomology & Marine Biology Group Meeting. This Group will now meet at the National Museum, Russell Street, Melbourne.

Wednesday, 4 February—Geology Group.

Thursday, 5 February—All future meetings of the Mammal Survey Group will be held on the first Thursday of every month, in the Seminar Room (Ground floor), Sir Arthur Rylah Institute for Environmental Research, Cnr. Brown Street and Stradbrike Avenue, Heidelberg.

Thursday, 12 February—Botany Group. Advance notice of an identification night of Western Australian wildflower slides. Will members with good, correctly identified slides bring a selection to be shown first, so anyone with slides of the same plant can name them, if time is left these will be followed by un-named slides and an attempt will be made to identify them. Please bring any books which may be helpful.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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Mammal Survey: Mr. P. Homan, 40 Howard Street, Reservoir 3073.

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

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Screenings of 150 award-winning and accepted colour slides of wildflowers and native plants from Victoria and other States, with a commentary on the plants.

MELBOURNE	—	**Monday, 2nd March Tuesday, 3rd March Wednesday, 4th March** } **at V.A.Y.C. hall Gisborne Street, East Melbourne**
LAUNCESTON	—	**Friday, 6th March, at Museum Lecture Theatre, Paterson Street.**
BURNIE	—	**Saturday, 7th March, at Town Hall, Cattley Street.**
GEELONG	—	**Wednesday, 11th March, at McPhillimy Hall, LaTrobe Terrace.**
YALLOURN	—	**Friday, 13th March, at Kernot Hall.**
BAIRNSDALE	—	**Saturday, 14th March, at Presbyterian Hall, Main Street.**
HORSHAM	—	**Tuesday, 17th March, at Mibus Memorial Cultural Centre.**
WARRACKNABEAL	—	**Wednesday, 18th March, at High School, Tregear Street.**
BOORT	—	**Thursday, 19th March, at High School, Malone Street.**
SWAN HILL	—	**Friday, 20th March, at Memorial Hall.**
BENALLA	—	**Saturday, 21st March, at Town Hall, Nunn Street.**
FRANKSTON	—	**Wednesday, 25th March, at Mechanics Hall, Bay Street.**
RINGWOOD	—	**Wednesday, 1st April, at Norwood High School, Byron Street.**
MARYBOROUGH	—	**Thursday, 2nd April, at Lower Town Hall, Neil Street.**
HAMILTON	—	**Friday, 3rd April, at Art Gallery Auditorium, Brown Street.**
ELTHAM	—	**Saturday, 4th April, at Youth Club Hall, Youth Road.**
MILDURA	—	**Saturday, 11th April, at Bolte Gallery, Cureton Avenue.**

All screenings at 8 p.m. **Admission: Adults 50 cents, Children 20 cents**

The Victorian Naturalist

Editor: G. M. Ward

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The pelican in pensive mood was photographed by the Editor at Sir Colin MacKenzie Sanctuary.

T. S. Hall Memorial Lecture

The Life of the Present and the Life of the Past

By EDMUND D. GILL*

Dr. T. S. Hall studied both the life of the present and the life of the past for he was both a biologist and palaeobiologist, a teacher of zoology and a research worker in fossils. Life is a continuum, so the life of the present and the life of the past are one. To separate these is an error that seems to have arisen largely out of the severe specialization that the increase of knowledge has forced upon us. Hall took the broad view of life. He studied the extinct graptolites of hundreds of millions of years ago, the Cainozoic mollusca that lead to those presently living, and studied also many forms of living things. For him life was one and indivisible, a philosophy that lies behind "Biological Science: the Web of Life", the book published in 1967 by the Australian Academy of Science.

Career of T. S. Hall

But let us go back to the beginning of this story. Born in 1858, T. S. Hall was a Geelong boy who did well at school, gaining exhibitions to Ormond College in the- University of Melbourne. He took a B.A. with honours in Natural Science in 1885, and a D.Sc. in 1908 when he was 50. The zoology course in the 1880s was no different in principle from that which Charles Darwin did at Cambridge, but the content was greater due to the advances in knowledge between those times. It contrasts strongly with the course of today, which includes evolution and whole new sciences such as genetics and ecology. After a brief time as a teacher at Bendigo, Hall returned to the University, then from 1890-1893 was Director of the Castlemaine School of Mines. I imagine that it was here that he developed his interest in graptolites because they were so important for the gold mining then in its strength, and because there were so many well preserved specimens to be collected in that area. In 1893 Hall succeeded Dr. Dendy as lecturer in biology. Round about the change of the century was a time when many famous men held chairs in the University of Melbourne — Baldwin Spencer in natural science, Lyell in natural philosophy, Masson in chemistry, and Ewart in botany.

By his training and experience, Hall had a wide interest and considerable competence in natural history as a whole, because the time had not come when specialization was important. The many different kinds of taxa that he described, and were named after him because he had collected them, demonstrate clearly his real interest in both the life of the present and the life of the past. But in his own researches he kept mostly to palaeontology.

Hall took an interest in the Australian Association for the Advancement of Science and in the Field Naturalists' Club (which in those days had active support and leadership from the University), but especially in the Royal Society of Victoria of which he became a Council member at 38 (1896), then Librarian, and for 15 years (1899-1914) was Honorary Secretary. In 1914 and 1915 he was President, but failing health and strength prevented him doing what he wished. He died in 1916.

* National Museum of Victoria.

Something of Hall's mental odyssey with respect to research can be followed by his succession of papers published in the Proceedings of the Royal Society of Victoria. They total 37, of which about one third (12) were in co-operation with other authors, generally Dr. G. B. Pritchard (10 papers).

His first effort was on Ordovician sponges published in 1889, which was after he had been a teacher at Bendigo (Ordovician gold country) and before he went to Castlemaine (the same type of country). Next came a paper in 1892 on graptolites, on which group he wrote nine papers. In the same year G. B. Pritchard wrote a paper on these organisms. In 1893 Hall wrote on some Tertiary fossils and soon after Pritchard did so too. Later Hall and Pritchard co-operated in publishing 10 papers on Tertiary formations. Hall's great breadth of interest is proved by the fact that he described fossil worms, sponges, polyzoa, corals, molluscs, echinoderms, crustacea, fish, whales and marsupials. In 1897, in co-operation with Professor Baldwin Spencer as senior author, Hall published his only paper in the *Proceedings* that dealt with living forms (isopods). Hall also wrote many articles for the *Victorian Naturalist*. They deal with a remarkable variety of subjects — the Buchan Caves, echinoids, eels, lizards, fish, biological nomenclature, glacial beds, musical sands, and many others. Hall gave lectures to the Field Naturalists' Club and led excursions for them. For example, he conducted an excursion to Mt. William to see the aboriginal axe-stone quarry. It helps us to visualize the very different conditions then, when we read that some excursionists went by train to Lancefield the night before, while others "dared the discomforts of the early morning suburban trains" (steam), then caught a country train to Lancefield, arriving at the starting point of the excursion feeling "they had already spent a long day". That evening, after the main party had returned to Melbourne, Hall and Armitage stayed at a local farmhouse, then the next morning went looking for graptolites. In the afternoon they climbed to the top of Mt. William, returning in the evening so as to be ready to start work on Monday morning. That was in 1908 when Hall was 50. In the *Argus* he wrote a series of "geological rambles". These were widely appreciated, and so were supplemented and published as "Victorian Hill and Dale." Most of Hall's teaching was neontological, while most of his research was palaeontological. He thus dealt with the life of the present and the life of the past. Hall's work gained the attention of the Geological Society of London, which was a real honour for a "mere colonial".

Effect of Evolution

The year after Hall was born, Charles Darwin published "The Origin of Species" and Hall's life was lived in the turmoil that resulted from this vastly different explanation of the origin of the various kinds of life. It was a completely new interpretation of the relationship of the life of the present to the life of the past. Some accepted the new theory, some rejected it, and some tried to make a compromise by saying that evolution may apply to all taxa except man himself, and that some new principle was needed to account for man, the only self-conscious organism. Here was an effort to break the continuity between the life of the past and the life of the present. Darwin in his own quiet way expressed the confidence that the gap would be filled, but did not debate it. He possessed a gentlemanly sensitivity with respect to people's feelings and convic-

tions. He did not indulge in mental confrontation as did some of his supporters. However, the fill-gap came to be popularly known as the "Missing Link".

It was not till long after Hall had died that Darwin's prophecy came true. The "Missing Link" was discovered in the Australopithecines of South Africa. Indeed, so truly intermediate was this subfamily between the ancestors of the apes and present man that the experts argued for 25 years as to whether *Australopithecus* belonged to the Pongidae (apes) or the Hominidae (men). The genus is now definitely in the Hominidae. Dr. K. P. Oakley suggested that until the anatomical detail has been worked we can think of Man as the Toolmaker (not just tool user, because many animals from ants to apes will take a stone and use it). Man alone *makes* tools.

When the evolutionary idea took hold, there was a reaction against pedestal-building for man so common in Victorian times. Man was debunked. He was thought of in terms of his physical origins, and was regarded simply as the better beast. It is interesting to note that within a century the wheel turned a full round, for a few years ago Sir Julian Huxley, in an article in *Nature,* set up a new Kingdom called the Psychozoa for man alone. He claimed that there should be three Kingdoms — Plants, Animals and Psychozoans, the last containing man only.

In the meantime hundreds of fossil men had been found. It was discovered that man was far more varied in the past than now. At present there is only one genus with one species, but in the past there were at least three genera (in the modern sense) and quite a number of species. There has been a remarkable impoverishment in the human family. So Darwin's prophecy appeared to have been vindicated, and the gap between the life of the past and the life of the present along the human line had been filled.

But many scientists were still unhappy because there seemed to be too much change for the amount of time available. If all this were true, then man had an accelerated evolutionary rate, far exceeding that of other forms of life. Ingenious explanations were offered to account for this phenomenon, but the problem has been solved. Radioactive dating has shown that there is far more time than anyone at first contemplated. The human family has been on earth for some 2,000,000 years.

In the Olduvai Gorge in East Africa there exists the most complete history of man yet discovered. The layers of rock exposed in the Gorge are the leaves of this history book, and the story is there for all who will to read. Looking through the pages one can see the changing faunas — the evolution of the fauna that inhabits the country now — but associated with these remains are those of man. There is an inbuilt timepiece in this history book — the volcanic rocks whose radioactive minerals can be assayed by the potassium-argon method and so the time calculated. The lowest bed with evidence of man is 1.75 million years, which is obviously not the beginning of the story, so we can say in round figures that man has been on the earth for something like 2,000,000 years. This dating is so important that laboratories all over the world have checked it. The fossil evidence is so critical that the best scientists in this field have checked it. This is one of the outstanding discoveries of our century — that man was once quite varied with different species to suit different environments, and also that

man has been on the earth far longer than anyone had dreamed — some two million years.

The new idea of evolution was so revolutionary that it led to a certain imbalance in thinking. Through a misunderstanding of the principle of natural selection there grew up the laissez faire policies in economics. The argument was that Nature is "all red in tooth and claw". Unbridled competition is the natural law it was claimed. This led to excesses that obviously needed correction, and modern economic policies no longer use the laissez faire principle. There is a good deal of control and protection both nationally and internationally. Another result of thinking of man as merely the better beast was a crop of behaviourist and similar philosophies in the field of psychology. In some of these interpretations man tended to become an automation, and so with much less responsibility for his actions. We hope that our views are more balanced now, but they have not returned to the outlook of Hall's day. Man was then thought of as tripartite, having "body, soul and spirit", but nowadays the unity of man is stressed. Man is the self-conscious species, that can foresee, and with memory recall the past. With this range of vision, he sets standards for himself and takes responsibility. He is the ethical animal. However, with the understanding of the fundamental genetic and biochemical make-up of man, there comes the idea of control of inheritance and possibilties are opening up of which the wildest thinker never dreamed in times past. So the gap that existed between the life of the present and the life of the past in Hall's day has been filled, and there are completely new possibilities in the life of the future.

History is change plotted against time, and the discovery of radioactive dating has put perspective into the history of man. Archaeological discoveries indicate that man has been a city dweller far longer than previously envisaged — some 10,000 years. New problems arose when instead of small hunter-collector groups there were large numbers in confined spaces. Gradually man organized himself until now he has become the most gregarious vertebrate of all with as many as 10,000,000 people in the one city. Variants that would not survive in the wild, survive in the protection and medical care of the city, so that man is gradually becoming different. As primary industry employs fewer and fewer people, because of machines, secondary industry employs more and more because of the sophistication of secondary products. Thus more and more people come to the cities, and because that is where the market is, more and more industries go there. So the countryside is being de-populated and civilized people are becoming predominantly city dwellers. They are becoming more and more divorced from their natural environment. This has gone so far that in Chicago they have a zoo where children can see what a horse, a cow and a sheep look like. In the Science Museum in Denver a blacksmith gives a daily demonstration of how in the olden days shoes were put on a horse. So the life of the present is becoming more and more different from the life of the past, not because evolution has gone off in a new direction but because man has determined the direction of his development, and society evolution has become more important than physical evolution. I believe that we will never succeed if we go against natural laws, and therefore for the life of the present and the future we should make a closer study of biology. This lecture is a tribute to one who appreciated the importance of biology for man in understanding himself and his environment.

Gliders of the Porepunkah District

By CLYDE O'DONNELL

The Greater Glider (*Schoinobates volans*), is to me, the most majestic and graceful of all the phalangers. As they are quite plentiful in my home area, I have taken the opportunity to study in detail, and with pleasure, their natural habits. North-eastern Victoria is an excellent locality for the Greater Glider, especially in the south of the region. However as most of my surveys have been carried out in the Upper Ovens Valley, I have not accounted for habit variations elsewhere. The township of Porepunkah is situated in this valley, surrounded by some of the most rugged mountains in Victoria. Extending from the foothills to the west, the granite formed slopes of Mt. Buffalo rise steeply towards the plateau. The Mt. Porepunkah range forms the northern slope which rises to some 4,000 feet. Although pine plantations are gradually expanding over the eastern and southern areas, there is still plenty of natural forest land. The natural forest consists mainly of ten species of Eucalypt, including Snow Gum and Woollybutt on Mts. Buffalo and Porepunkah.

The majority of the glider population is found in the Peppermints of the mountain slopes and the Eurabbie (*E. bicostata*) stands of the gullies.

While most of my experience was gained in the field, many interesting facts were learnt from captive specimens which were brought to me by forest workers. In such cases the animal was either orphaned or injured when its home was destroyed during clearing operations in the bush. When the glider became independent, it was released, either among Peppermints on our property, or in a nearby gully where *E. bicostata* flourishes.

One evening in October of 1967, I set off on a routine glider survey, accompanied by my fellow naturalist, Raymond Carlson from the neighbouring town of Wandiligong. After carrying the equipment necessary for observations for nearly two miles into the bush, we stopped amidst a group of aging Eurabbies (*E. bicostata*). Here we made preparations for the fast approaching night by setting up a tape recorder, and selecting spotlighting positions. As well as our six-volt flashlights, Ray carried a pair of binoculars while I used a small field telescope to gain a more detailed view of the gliders. Our preparations complete, we waited eagerly. As the twilight faded, a male South-eastern Ring-tail (*Pseudocheirus laniginosus*) was the first to make an appearance. A few minutes later, the female of the species appeared nearby with a rufous coloured youngster clinging to her back. The silence of the bush was broken by the usual whispering conversation.

After listening to "Mopoke" some thirty times, a Greater Glider made a sudden appearance on the trunk of a nearby Narrow-leaved Peppermint (*E. radiata*). Hoping to discover its sleeping apartment, I moved in closer, directing my spotlight on to the hollow limbs of an old eucalypt nearby.

I was surpised to see instead, many tiny pairs of eyes belonging to the elusive Feather-tail Gliders (*Acrobates pygmaeus*) assembled at the entrance of their piped limb home. These tiny creatures measuring a mere four inches from head to tail tip, each in turn spanned the distance of about

fifteen feet in prolonged leaps to the nearest tree. As they were smaller than a single leaf they soon disappeared amidst the foliage. Two more Greater Gliders were sighted, so our attention was turned to them once more. One of the two gliders, a female, climbed high in its nest tree to munch gum tips, and here it was soon joined by the first glider we had spotted. The third animal glided off into the darkness with us in pursuit. The glider, in four successive volplanes, covered a distance of 220 yards before joining its mate for a quick snack of Manna Gum (*E. viminalis*) foliage tips. We later found a four month old young in the females possession. However, it did not leave the nest hollow before 11.30 that night.

Only the males appear to make their routine glides in this season, during which the female carries her young in the pouch. As a means of travel, the female usually makes large leaps and occasionally a very short glide. This is very likely because the young would otherwise be crushed on impact of the mother's landing. At the age of four months, the young which is still in the suckling stage, may often be found alone at the entrance of its nest hollow at night; however the parents are seldom far away. This may be an instinctive method adopted by the parents to encourage the young in gaining self confidence.

On this particular occasion the female ventured no more than 100 yards from the nest, and spent the first one and a half hours in the crown of the nest tree. The male spent much of the night feeding in neighbouring trees of *E. bicostata* and Narrow-leaved Peppermints (*E. radiata*). It did not return to the nest that night, thus giving the impression that the young is cared for entirely by the female. As our observations led us farther afield in the following hours of darkness we only noted the time of the males return, which was at approximately 3.35 a.m.

As for the Feather-tail Gliders (*Acrobates pygmaeus*) mentioned earlier, I regret to say that when the spot was visited twelve months later, only sixteen lifeless bodies were discovered in their ancestral chamber. This is the only colony of the species I have observed in the area.

Further inspection revealed a colony of some thirty Little Brown Bats (*Eptesicus pumilus*) in the hollow trunk of another tree nearby.

On another occasion I studied the gliding habits of the greater Gliders in a nearby fern gully, where there is an abundance of wildlife. School associates Raymond Carlson, and Geoffrey Sparks, assisted in the construction of a crude but comfortable log cabin which we concealed beneath a cover of Soft Tree-ferns (*Dicksonia antarctica*). It was in late Summer, during our usual excursions on a moonlight night that the Boobook Owl (*Ninox boobook*) as the soloist, was outstanding and mystical; accompanied occasionally by the eerie cry of the Dingo (*Canis familiaris dingo*). The measure of time was beaten out by Great Grey Kangaroos (*Macropus major*) thumping as they passed by. The strolling Wombat (*Vombatus hirsutus*) was seen, and the cheerful Long-nosed Bandicoot (*Perameles nasuta*) scampered along the moonlit track.

But in the trees, the trapeze artists were to me the main attraction. With a loud throaty cough, a Common Grey Brush-tail (*Trichosurus vulpecula*) scaled the trunk of a tall eucalypt with ease, while higher up in the branches *Pseudocheirus laniginosus* swung about suspended by their prehensile tails. Sugar Gliders (*Petaurus*

breviceps) appeared now and again as they drifted through the air from tree to tree.

Then all at once, the bushland orchestra was interrupted by the startling shriek of the Greater Glider. My attention was then concentrated on the great acrobat.

After uttering a series of peculiar gurgles it launched itself from a tall gum tree in a long volplane. It then disappeared among some tall Black Woods (*Acacia melanoxylon*) which obscured its landing. A few minutes later four more Greater Gliders could be heard as they awoke from sleep; and after surveying the surroundings, each animal climbed high in the branches of its tree. Some of the gliders stayed in their home trees where they fed contentedly on the eucalyptus blossoms, while two of them set off towards other feeding grounds. One animal with a long thin tail climbed to the end of a dead bough some ninety feet from the ground, where it sat nodding its head for about fifty seconds, possibly trying to judge the distance for a landing. This is a common occurrence with Greater Gliders.

(Care must be taken not to direct a flashlight on the animals while they are gliding, otherwise its landing speed may not be checked in time, resulting in the animal becoming injured.)

The glider, after checking the distance, gave a powerful heave with its hind legs, and then glided rapidly downwards at an angle of about 55° before landing with a loud flop on a tree some fifty yards away. I then followed it to an area of Red Stringybark (*E. macrorhyncha*) and Long-leaved Box (*E. goniocalyx*), the foliage of which it ate. From here I watched another, a fine specimen, make a long and graceful glide across the narrow gully. This animal had a broad brush tail, and measured about 39 ins. The most graceful glides were observed across this gully, and the numerous skeleton gums provided excellent launching positions. Some Gliders habitually make rapid glides, while others are slow and graceful. Incidentally, the swifter glides are often made by the animals with thin and longer tails. I also noticed that many of the gliders had well charted air routes along which they travelled soon after emerging from sleep. Some gliders preferred a dead bough from which to glide, while others favoured the fork of a bough either just inside, or at the base of the crown. However the longer glides were usually made from the fork of an isolated bough at the very top of the crown. In such cases the animal after launching, would firstly glide clear of the crown and then dive through an opening in the interlocking trees, before gliding horizontally among the trunks. The volplanes observed in the larger stands of *E. bicostata* were usually short, enabling the animal to land halfway up the trunk. Where specific air routes had been formed however, long distance glides were made, and the glider would land on the base of the tree.

Once, while searching for Feathertail Gliders in a mountain gully, I flashed my spotlight on the glowing eyes of a Greater Glider perched amongst the foliage of a Wonga-vine (*Pandorea pandarana*). On approaching the animal I noticed that it was an albino, only the second I have seen, and like the first albino I observed on Mt. Buffalo, its tail was longer and thinner than usual. For the next three hours I watched the glider closely, and noted its activities. For about an hour it fed on the flower buds of the Wonga-vine; however while in the lower storey it also relished Black Wood (*A. melanoxylon*) blossoms and the tender flower buds of Hazel Pom-

aderris (*Pomaderris aspera*). Later it glided from the top of a large Black Wood, and gradually made its way to the upper storey where it fed chiefly on the blossoms, buds and foliage of Manna Gum (*E. viminalis*), Red Stringybark (*E. macrorhyncha*), Narrow-leaved Peppermint (*E. radiata*) and Broad-leaved Peppermint (*E. dives*). Seldom have I seen a Greater Glider in the lower storey of vegetation except in the Black Woods. It was on one of these occasions that I observed the albino again, the following week-end, with a drab grey and white companion. Grey and white specimens are a common sight, but most of those seen were the usual colour of dusky black on the upper surface and creamy white underneath. Although many have grey and white tails, some Greater Gliders have a patch of white at the base of the spine. Here the fur is short cropped and usually a soft grey in colour.

Certainly, the Greater Glider is one of the wonders of nightlife in the Australian bush.

[Due to possible overlapping of species in this area, some confusion may have arisen on occasions between the Greater Glider and the Fluffy Glider *(Petaurus australis)*. This is indicated by the mention of a shriek, which normally emanates from the latter species, the former being regarded as silent — Ed.].

Letter to the Editor

Dear Sir, **Aboriginal Sacred Rocks on Bald Hill, Clematis.**

As is well known, the proposed Cardinia Creek Reservoir will submerge a considerable amount of country in the Emerald-Clematis area of the Dandenongs, and when full will reach the 550 ft. contour level. Regrettably, when conserving water for the needs of the community the landscape is always altered and much wild life lost. In this particular instance, moreover, it appeared possible that the sacred rocks representing the Crow and two of Bunjil's Young Men, which figure so prominently in the legend of how the Aborigines obtained fire, would also be submerged.

This would have been a tragedy, since Aboroginal antiquities around Melbourne are few, and these rocks are unique; therefore, after consultations with Mr. D. Lee, Hon. Secretary of the Field Nats, and Mr. G. M. Ward, Hon. Editor of the Victorian Naturalist, it was decided that I bring the matter to the attention of the Chairman of the Board of Works, so that, if necessary, steps could be taken for the preservation of the rocks, perhaps by constructing a water-retaining dyke or by removing them to higher ground.

Field Naturalists will be pleased to know that I found that gentleman and the other Officers of the Board most understanding and co-operative. The position of the rocks was surveyed and I have now been notified that the one representing the Crow will be 34 ft. above and 150 yards, and those representing Bunjil's Young Men will be 69 ft. above and 300 yards away from the waters' high level mark. The rocks are therefore safe.

For those interested in the description of the rocks and in their associated legend, they were published by me in the *Victorian Naturalist*, Vol. 78, p. 106, 1961; and a fuller version of the legend, subsequently obtained from an old Aboriginal lady at Coranderrk, was published in my book, *Bunjil's Cave*, in 1968.

Aldo Massola.

Australian Natural History Medallionist for 1968.

Dr Norman Barnett Tindale

by Hans Mincham

(Information Officer, South Australian Museum)

Norman B. Tindale was born in Perth, Western Australia, on 12 October, 1900. In 1906 he went with his parents to Japan where his father was engaged in missionary activity until 1915 when the family returned to Perth. Young Norman's first teachers were Swiss-French at the Tokyo Grammar School. He next attended the Tsukiji Grammar School run by the U.S.A. community, and finally became a student at the Tokyo High School at Yotsuya.

Back in Australia he attended the Perth Boys' School for a year, matriculating there. At this stage his father was transferred to Adelaide and by then Tindale, deeply interested in Natural History, was keen to engage in Museum work. No position was available at the South Australian Museum, but he secured a cadetship at the Public Library under an arrangement that he could transfer to the Museum if a vacancy arose. In 1919, a year later, his opportunity came and he was appointed Assistant to the Entomologist, A. M. Lea.

As a lad in Japan, Tindale developed interests that were eventually to split his scientific pursuits into two very different fields — entomology and anthropology. He was a frequent visitor to the Imperial Museum, Tokyo, where he lingered long studying butterfly specimens as well as all of the material displayed there relating to the primitive Ainu people of northern Japan.

Established at the Museum he pursued entomology until 1921, when he went as a member of a party to Groote Eylandt in the Gulf of Carpentaria, at that time the largest unexplored island off Australia. There he spent 15 months. Lea, the Museum's Entomologist, was keen to have insect specimens (particularly Coleoptera) from islands off Australia, but it was felt that Tindale should also make the most of the opportunity to record observations on, and gather material from, the natives of the region, then largely untouched by European influences. To equip himself for this part of the undertaking Tindale received some training from Sir Baldwin Spencer in Melbourne.

The result of the extended stay on Groote Eylandt (which was made possible by the Church Missionary Society then concerned with the choosing of a site for a Mission Station) was a remarkable collection — insects of many orders as well as mammal and plant specimens, and a large body of observations on, and material from, several tribes which had previously never been definitely noted in literature. This was a very considerable achievement for the young man who spent his 21st birthday on Groote Eylandt.

Back in Adelaide Tindale proceeded with his University studies. Because of his work he could take only one subject a year, which he did until he secured his B.Sc. He continued as

Assistant Entomologist until 1928 when he filled the newly created position of Ethnologist, but he also served as Assistant Entomologist until 1933, when H. Womersley succeeded Lea who had died in the previous year.

In 1929 with H. M. Hale he conducted archaeological excavations at Tartanga and Devon Downs on the River Murray and this work, combined with study of rock shelter sequences in the following years, established a cultural sequence covering 12,000 years. He also identified Pleistocene open-air assemblages dating back to 26,000 years ago.

Granted a Carnegie Travelling Fellowship in 1936, Tindale spent from June of that year to April 1937 visiting museums in U.S.A. and Europe collating Australian data from no fewer than 58 museums. An enormous mass of notes, photographs, and sketches was the outcome. This research forms the background of much of his continuing work on the Australian Aborigines.

Tindale's knowledge of Japanese made him a useful Intelligence Officer during the Second World War and he served in New Guinea, Solomon Islands, and the United States with the rank of Wing Commander. Following the war he spent six months in Japan assessing research data for the U.S. Army and then returned to U.S.A. to spend eight months there preparing a technical report for the U.S. Government and studying in various museums before returning to Australia. In 1959 he made his third trip to U.S.A. to spend that year as visiting Professor of Anthropology at the Universtiy of California in Los Angeles. He travelled extensively during vacation periods.

In 1961 Tindale was a special delegate to the Pan Pacific Science Congress held at Honolulu, following which he carried out a month's research work in U.S.A and at the British Museum.

Throughout his museum career Tindale was actively associated with the Royal Society of South Australia in which he held the positions of President, Secretary and Librarian. In 1956 he was awarded the Verco Medale. Other activities he found time for in his crowded career included lecturing in Forest Entomology at the Adelaide University and in Conversational Japanese for the W.E.A.

Following his retirement in 1965 from the position of Anthropolgist at the S.A. Museum, Tindale engaged in field work in the Western Desert and in various areas in Western Australia in preparation for a new map of the Aboriginal Tribes of Australia. In 1966 he was invited to serve for a year as Visiting Professor of Anthropology at the University of Colorado in Boulder where he was awarded a Doctorate in Science (Honoris causa) for research in anthropology. He then lectured for another year at the University of California in Los Angeles while continuing his work on Australian tribes. In 1968 he returned to Australia with a Warren Greenfie'd research grant to continue field work and studies for his tribal map.

Tindale's scientific career has included an enormous amount of field work. The number of expeditions he has taken part in and which led to significant published contributions to anthropology, archaeology and entomology exceeds 40. His published work includes approximately 120 papers in anthropology and upwards of 40 in entomology. Others range through ornithology, geology and botany. His entomological work in-

cludes extensive writings on the Moth families Hepialidae and Cossidae and the Butterfly family Satyridae upon all of which he is currently working as a relief from his other studies. His complete bibliography totals 175, including three books written in collaboration with H. A. Lindsay. Such a range of active scientific endeavour was not exceptional in the 19th century, but it is rare to find a scientist in our time who has applied himself so successfully and significantly in such diverse fields. He was a worthy choice, indeed, for the 1968 award of the Australian Natural History Medallion.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor.

Orchids at Sandringham

This heartening note comes from Mrs. Bennett of Sandringham, Victoria.

It was in 1922 that I first set foot on a block of land in Bay Road, Sandringham. The coastal tea tree, *Leptosphermum laevigatum* was growing freely and among the vegetation were *Ricinocarpos pinifolius, Caladenia patersonii, Bossiaea cinerea,* Bracken fern (*Pteridium aquilinum*) which latter grew to a height of six feet on the eastern boundary fence.

The property faces north and during 1923 my husband and I built our home there, causing surprise among the builders because we would not allow more than was necessary of the native growth to be cleared for the building.

Gradually over the years as the garden was cultivated, a certain amount of the original vegetation was removed or died out and in 1929 half the property was sold and a neighbours home was built. A few natives survived in our garden (mostly tea tree) and a lawn in front continually mowed.

A patch of *Dichondra repens* (Kidney weed) at the edge of the lawn under a hedge of tea-tree (self sown) has always survived despite the mowing, and this year was somewhat neglected. To my surprise and delight, among this Kidney weed various grasses and some moss, a colony of greenhoods once common to this district (*Pterostylis curta*) was discovered. Six flowers were in bloom (20 September) and in all sixteen bloomed. Several small stalks about one inch high suggested that the flowers had been mown off earlier. The last flower is now finished (1 November).

The colony of plants, about sixty in all, cover a space at least three feet square in area. Needless to say the colony is now plainly marked so that observations may be made during the coming year.

Diseased Wombats?

From Mrs. J. C. Betheras of East Malvern, Victoria, comes this comment concerning the Nature Note on the wombat by Mrs. Lyndon in the last issue of the *Victorian Naturalist*, 87(1) p. 10.

I have seen a wombat in a similar mangy state to that described, fumbling about in the daytime at Clematis in the Dandenongs. It was quickly put out of its misery by my late husband's gun.

I have wondered since whether this condition was caused through disease, or merely through old age.

A Note on Madimadi †

by L.A. HERCUS*

A recently published work, *The Languages of Victoria : A Late Survey*[1] contains a grammatical sketch of the Madimadi language, as well as some short texts and a vocabulary. Madimadi, called Mutimuti by Tindale[2], was spoken in the Balranald district of N.S.W. It is one of the 'Western Kulin'[3] group of languages, once spoken in Western Victoria and in parts of the Riverina, and it is closely related to the other Western Kulin languages that were recorded, namely Wembawemba and the Djadjala dialect of Wergaia (from the Lake Hindmarsh area). Our main informant, Mr. Jack Long, is the last full-blood Madimadi man; he now has little practice in using his language and his recollections, though excellent are fragmentary. During a recent visit he recorded some more linguistic material, and as so little is known of Victorian languages in general, it seemed appropriate to publish these further fragments.

Additional Vocabulary and Morphology [4]

binbaŋai	(my) shin
buludu	(his) mane. This word was previously attested only in *buludin-buludin* '(your) whiskers'.
burangada	to snore (cf. WW. *bureŋa* 'to snore').
burbi	hill. The *r* was weakly articulated and *bubi* was also heard. *burbi, bubi* is equivalent to the word for 'head' used without a possessive suffix, exactly like the Dj. word *burb* 'hill', *burbug* '(his) head'.
dadi	by and by, after a while.
dundada	to paralyse.
ganagada	to take away, to grab (cf. Ma. *gananda*, WW. *ganindja*, Dj. *ganindjela* 'to steal').
gilbara, magwara,	name of the two matrilinial moieties, as in Bagundji.

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†In this paper the same phonemic transcription has been used as in *The Languages of Victoria.* ŋ indicates a velar nasal (like 'ng' in 'song'), a dot under a letter indicates a retroflex sound, and a bar under a letter indicates an interdental; (thus d may be compared with English 'th').

gilu — by this one; alternative form for *gilaŋ*, operative case of the pronoun of immediate vicinity.

guleḏa-wil — wild, fierce, (cf. Ma. *gulewaḏa* 'to be angry', Dj. *gulien* 'angry').

miṇḏai — mythical giant snake, well-known from other Victorian languages, but not previously recorded in Madimadi. The operative case of this word is *mindaiu*, pronounced ['mɪndajU]. Evidently after *ai*, which could easily become [aj], the operative suffix was *-u*, as after consonants.

miṇi — hole. This is the non-possessive form of the word. The possessive form was previously recorded in *miṇu ḏaga* 'hole-his ground-of', 'his burrow'.

muweŋgaḏa — to take a wife, to marry.

ṉiṉan — this one (object case). This probably is a faulty form based on the false analogy of the personal pronouns *jinan* 'me' and *ŋinan* 'you'. In the Madimadi language material recorded by us all the many different demonstrative pronouns invariably followed the nominal declension and did not distinguish an object case.[5]

ṉuluŋ — from that one; ablative of *ṉuli*, demonstrative pronoun of middle distance.

ṉuṉaŋuŋ — from that one. This is the ablative of *ṉuṉi* 'that one over there, demonstrative pronoun of middle distance. This word clearly indicates that the post-vocalic form of the ablative can be *-ŋuŋ* (as well as *-guŋ*). *-ŋuŋ* had been heard only once before in *manaŋuŋai (mana-ŋuŋ-ai)* 'hand-from-mine' 'out of my hand', and it had not been mentioned as a possible alternative to *-guŋ* in the list of case suffixes.[6]

ŋaliŋai — back of my neck (cf. Dj. *ŋali* 'back of neck').

wuḏuwaŋin — inside you (cf. Ma. *wuḏubar* 'in the middle'). The form *wuḏuwaŋin* 'inside you' shows that in Madimadi the possessive suffix was used to express position in relationship to a person, exactly as in WW. *warmandag* 'behind me'.

Simple Sentences

ŋindi	*ŋeŋgaḏi*	*ṉagiladi*	sit down and watch
you	sit	watch	
	(imperative forms)		

mada	*ŋindi*	*gumbi*	don't go to sleep
not	you	sleep (imperative)	

dadi	*gini*	*wuduŋi*	*bermiladin*	by and by this man will sneak about
soon	this	man	sneak-will	

bugadin	*baibulu*	he took his kidney-fat
took	kidney-fat-his	

galgin	*wuduwaŋin*	*buduŋadin*	he destroyed the bones inside you
bone-yours	inside-you	destroyed	

bambadin	*jidi*	*buwuga*	I was frightened of the ghost
feared	I	spirit-of	

jujugadin	*jidi*	*gini*	*wuduŋi*	I dreamt about this man
dreamt	I	this	man	

gumbada	*gini*	*wuduŋi*	*buraŋgada*	this man is asleep, he's snoring
sleeps	this	man	snores	

bambada	*nuluŋ*	he's scared of that man
fears	that-one-from	

jinadu	*beradai*	*mada*	*dirawadin*	*laiur, mada*	*muweŋgadin*	*laiur*
my	younger-brother-mine	not	wished	woman, not	married	woman

my younger brother didn't want a wife, he never got married.

A short story in Madimadi

Jack Long related a Madimadi version of the story of *mindai*, the 'maned snake'. This creature is well-known in legends from many parts of Victoria and is variously called 'myndie', 'mindi', 'murndi' in earlier records,[7] and it is described as having a huge long body and large head. The Madimadi version of the story of *mindai* is interesting for its linguistic content, and for the way it combines the old legend with newer material. Such adaptations are usually made by people to whom the mythology is still a reality that has to be reconciled with changed circumstances. This version of the *mindai* story also indicates that the Bagundji (Darling River)[8] type of moiety system with the division into Gilbara and Magwara extended into the Madimadi area. It had previously been known to exist among the neighbouring Dadidadi and Wadiwadi.[9]

mindai	*dulaŋgi.*	*ŋaliŋaŋu*	*geŋadin*	*buludu.*
mindai	long	back-of-neck-from-his	grew	mane-his.

The *mindai* was long. It had a mane growing from the back of its neck.

mindai giaga gilbara, giaga magwara.
Mindai one Gilbara, one Magwara.
One *mindai* belonged to the Gilbara moiety, the other was a Magwara.

gilbara guleda-wil, magwara delgu.
Gilbara savage, Magwara good.
The Gilbara one was savage, but the Magwara one was tame.

bugi gini mindai, dagaŋ lanu.
bad this *mindai,* ground-in camp-his.
That Gilbara *mindai* was bad. It lived in the ground - (but it would get in and out through the water-hole and on fine days it would be out or sitting waiting in that spring).

gadinada ŋeŋgada . bebada gadini.
water-in sits . jumps-up water
It would sit in the water-hole and the water would then rise up suddenly.

binadin ganagadin wuduŋi, mujuŋguru gagadin ninan,
came-out grabbed man, spirit-power-with-his caught him,
It would come out of the water, and grab a man by means of its spirit power.

dundadin ninan.
paralysed him.
and then it paralysed him: (- if you got away in time you were all right. It had this power in its eye).

mindaiu dagadin, ŋurgadin.
Mindai-by ate, swallowed.
The *mindai* then ate and swallowed him.

wauwunmadin mindai, delgaiadin bilinu, mandu.
full-was *mindai,* good-was stomach-his, flesh-his.
The *mindai* was satisfied then, its stomach and its whole being felt good.

bambadin |nunaŋuŋ wuduŋi
feared this-one-from man.
People were scared of it; (- and then one day for the first time this *mindai* saw a bullock which had come to the water-hole).

gini didi gubiladin gadini.
this beast drank water.
The bullock had a drink of water.

gagadin gilu mindaiu, maŋgadin gini didi, dagadin.
caught this-by *mindai*-by, took this beast, ate.
Then it caught the bullock and took him and ate him.

bugi mindai, didi widul. wigadin.
bad *mindai,* beast big. died.
It was bad this *mindai,* and the bullock was too big for it, and so it died.

waiwulaŋu nagadin, buwadin gini gadinuŋ.
whitefellow-by saw, dragged this-one water-from.
A white-fellow saw the dead *mindai* and dragged it out of the water - (he had to use a whole bullock-team to get it out, and it was then that people could see that the *mindai* was 70 to 80 yards long. That's how the bad *mindai* finished. The Magwara one was all right and it may be there yet).

1. Published by the *Australian Institute of Aboriginal Studies*, Canberra 1969.

2. N.B. Tindale, *Transactions of the Royal Society of South Australia* 64, 1940, p.192.

3. W. Schmidt, *Die Gliederung der Australischen Sprachen*, Vienna, 1919.

4. The following abbreviations have been used:
   Ma. Madimadi.
   WW. Wembawemba
   Dj. Djadjala

5. *The Languages of Victoria: A Late Survey*, p.170.

6. *ibid.* p.161.

7. R. Brough Smyth, *The Aborigines of Victoria*, Vol. 1. Melbourne 1878, p.444; also A.C. Stone, 'The Aborigines of Lake Boga', *Proceedings of the Royal Society of Victoria*, N.S. XXIII (1911). His 'murndi' is only 10 ft. long.

8. A.P. Elkin, 'Kinship in South Australia', *Oceania*, Vol. IX (1938), p.42, and more recently: J. Beckett, 'Marriage, Circumcision and Avoidance among the Maljangaba of North-West New South Wales.' *Mankind*, Vol. 6, No. 10, p.457 note.

9. N.W. Thomas, *Kinship Organisation and Group Marriage in Australia, Cambridge*, 1906, p.49.

Field Naturalists Club of Victoria

ANNUAL MEETING

The Annual Meeting will be held in the National Herbarium on

WEDNESDAY, 11 MARCH, 1970

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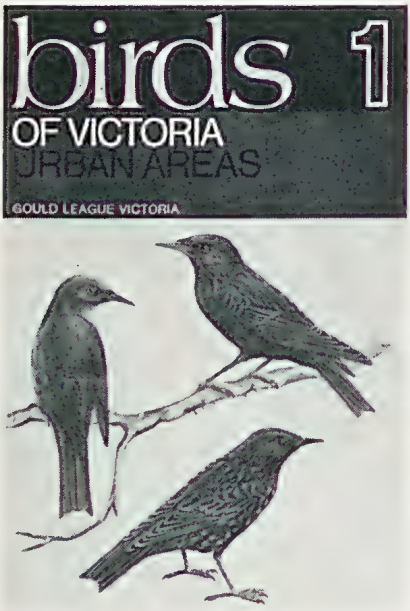
Published by the Gould League of Bird Lovers of Victoria.

5½" x 7", stiff card covers with sewn binding. 72 pp. with 28 pp. of colour illustrations and ecological map of Melbourne area. Paintings by Margo Kroyer-Pedersen. Price $1.50.



Surprising as it may seem, I have friends who although having lived in Melbourne suburbs all or most of their lives, still tend to confuse starlings with blackbirds, and female blackbirds with English thrushes. I must admit as well, that house-sparrows and tree-sparrows tend to confuse me without some thought on the matter.

From now on however, with the introduction of this, the first part of the Gould League group of bird books; all this confusion and lack of knowledge about our common suburban birds should cease. By skilful arrangement, a tremendous amount of information about these birds has been placed between the covers of this book.

Beginning with an explanation of "What is a Bird", by Jack Hyett; and continuing with silhouetted bird recognition groups; the ecology of urban areas; the details of individual birds; and finally to a most comprehensive index and bird list — the book has been remarkably well planned. Indeed, is it any wonder when one realizes the amount of work by so many well known people which has gone into its preparation.

Even the birds which do not appear as full color plates; and which are liable to cause difficulty in identification, have been treated as marginal illustrations to show their distinctive characteristics.

If there was a financial reason why previous bird books with hand paintings were unable to be bought, there is certainly no such reason in this case. Indeed, my personal opinion is that I would prefer a collection of this type of book, which one can use; rather than the volume which is transferred from bookshelf to table on rare occasions.

Future titles to be published include:

Birds of the Ranges.

Birds of the Ocean, Bays and Beaches.

Birds of the Inland Waterways.

G.M.W.

Australian Flycatchers and Their Allies

by Brigadier HUGH R. OFFICER with illustrations by PETER SLATER

Published by *Bird Observers Club, Melbourne,* 1969. 108 pp., 12 colour plates, hard cover 10 in. x 7 in. Price $5.00.

This is a companion volume to Australian Honeyeaters by the same author but a higher standard has been achieved. The coloured illustrations of all 66 species make immediate identification a simple matter. In the case of those with similar plumage, a glance at the excellent distribution maps by Alex Stirling or reference to the text should enable identification by even the rankest amateur.

Another important innovation is the placing of males and females on separate pages. This is especially useful where females of closely allied species — such as the red robins — have the same superficially plain colourless appearance. The inclusion of immature plumage is commendable as there are very few easily accessible sources of reference to this important phase.

In the Introduction there is a brief classification of vegetation by Mr. A. R. McEvey of the National Museum. This should greatly assist the bird watcher with little or no knowledge of botanical terms and perhaps form the basis of a standardised habitat reference. Apart from the enormous wealth of information supplied, the Brig's inimical style is a source of delight. Who, for instance, will in future fail to recognise the Leaden Flycatcher when he hears its call of "squank"?

As far as possible the coloured plates are contiguous to the text though I found it mildly irritating when this was not so, no doubt because of printing limitations. Also the omission of the small spot on the forehead of the Flame Robin should be rectified in future editions. These are minor points which do not detract from the excellence of this book which will be of great value to all bird watchers and to anyone even vaguely interested in birds.

Pauline Reilly

Orchids of Australia

A complete edition drawn in natural colour by W. H. Nicholls. Edited by D. L. Jones and T. B. Muir. Melb., Thomas Nelson (Aust.) Ltd., 1969. Price $30.00. Boxed. Size 13" x 10".

During September 1969 the Sixth World Orchid Conference was held in Sydney. To coincide with this event Thomas Nelson (Aust.) Ltd. published in one volume the monumental work by Nicholls on Australian orchids, making available for the first time a definitive collection of the authors work.

A member of our club, David Jones B.Sc.Ag. Horticultural Research Officer with the Victorian Department of Agriculture, collaborated with Bruce Muir B.Sc., Taxonomic Botanist at the National Herbarium to edit this work.

There are 750 species of orchids in Australia, most of which are endemic. These belong to 90 genera of which about 20 are endemic. Their unusual flowers are often seen mingled with the herbs of the forest floor or in contrast to the grasses on the hillsides.

Will Nicholls' formal education was only at Primary level. He became a bookbinder, and then a gardener. With a great interest in Australian orchids he felt the need for a comprehensive authoritative work describing these particular plants. Nicholls realised that a verbal description was not adequate for the identification of species, so he taught himself painting and enough Latin in order to compose formal descriptions for the many undescribed orchids which he found. It took Nicholls 27 years to prepare the monograph, which consisted of 500 orchid portraits, with numerous dissections of remarkably accurate detail.

It was intended to produce a total of 600 plates in groups of 24, publishing the estimated 25 parts over a period of 10 years. As publication proceeded the author would continue to draw missing subjects and newly described species. The retail price was to be £7.10.0 ($15) per part. Only four parts appeared as sales dwindled and further publication was thought to be uneconomic. The price for the original work would have been approx. $400 in 1950, certainly far more money than an amateur botanist could afford.

This one volume edition naturally has had to be modified to put it into a more realistic price range. The plates, illustrating almost 400 species, have been separated from the text and have been bound together at the back of the book, which makes reference a little more difficult. The captions are printed below the plates which is an improvement on the original method of placing them on the opposite page. The paintings in the first part of the original edition were reproduced photographically, whilst in parts 2-4 they were copied by hand on to zinc plates, and then printed by a lithographic process. In the present edition all the plates are reproduced photographically. This method is less expensive, and due to changes in techniques the reproduction in the majority of the plates is superior, with the exception of two or three, which through necessity have had to be photographed twice, making the final print a little fuzzy. Some of the larger plates are double page spreads, and in a few places the centre fold is across sectional details. The colours compare reasonably with the original paintings, which are as near to nature as watercolour pigments will allow, thus affording accurate identification by comparing a specimen with the plate. There are 476 colour plates, the balance of these from the original work were so incomplete as to make it unworthwhile including them in this volume.

The text is printed in two columns, making it more compact. It includes units of measurements, abbreviations, and a glossary of terms. There is a key to genera which is most useful, however the keys to species which were printed in the original publication have been omitted. To bring them up to date would have meant a major revision in every genus.

Although this volume may seem expensive, the value is in the wealth of information, precise descriptions and the magnificent colour plates. For the identification of the majority of Australia's orchids, the complete edition, *Orchids of Australia,* is the only work that you need to consult. No doubt the book will have the added value of being an important collector's piece of Australiana.

A limited De luxe Edition of 150 numbered copies is also available at a cost of $70.00. This edition is fully bound in leather and blocked with an orchid illustration on the face.

Rex and Sue Filson.

Unusually Large Specimens of Topaz and Augite

By A. W. BEASLEY*

Unusual specimens are often brought to the National Museum of Victoria for identification, and some are presented to the Museum. This article is concerned with two unusually large specimens of topaz and a large specimen composed mainly of augite in the Museum collection.

The largest topaz known to have been found in Australia is in the Museum collection. It weighs 6 lb. 6¼ oz. and is pale bluish green in colour. This specimen, portion of a very large crystal, was discovered in an old stream gravel at a depth of 60 feet during alluvial gold mining in the Cooyal Creek area near Mudgee, New South Wales. It was donated to the Museum about 100 years ago, and is believed to have been exhibited at the Intercolonial Exhibition of Australasia held in Melbourne during 1866 and 1867. In 1874 Professor Liversidge of Sydney University referred to the existence of this outstanding topaz specimen in the Museum, in a publication entitled "The Minerals of New South Wales". Although waterworn, the topaz still exhibits some crystal faces. Most probably it did not travel far after it was liberated by weathering from granitic rocks in the area. Much of the specimen is clear and flawless, but there is a well-defined crack which has resulted from the perfect basal cleavage.

Topaz, a fluosilicate of aluminium, occurs in coarse-grained granites and pegmatites, and is formed by the action of gases containing fluorine and water vapour emanating from igneous intrusions within the earth's crust. It crystallizes in the orthorhombic system, and prismatic crystals occur in cavities in the coarse granitic rocks. Usually one end of the crystal is terminated by pyramid faces and the other is flat as, when removed from the rock, breakage has occurred along a basal cleavage plane.

Most Australian topaz is pale blue or colourless, the yellow variety being rare. As it is durable and heavy, topaz is found in sands and gravels derived from the weathering of granitic rocks. It occurs associated with alluvial cassiterite (tinstone) particularly in New South Wales, Queensland, Victoria and Tasmania, where many waterworn pieces of pebble size have been found.

The second largest topaz specimen in the Museum collection is a waterworn crystal from near Stanthorpe in Queensland. It weighs 2 lb. 1 oz. and

Plate 1: Waterworn topaz crystal from Stanthorpe, Queensland. Weight = 2 lb. 1 oz.

Photo: E. R. Rotherham

* National Museum of Victoria.

is pale blue in colour. This outstanding specimen was found in an alluvial deposit during tin mining and was donated to the Museum about 60 years ago. Although waterworn, much of the original crystal shape is discernible.

Topaz is a valuable gemstone, and many beautiful gems could be cut from these two unusually large specimens. However, because of their special value as rare specimens, they will never be cut. Other smaller topazes, particularly ones from Oban in New South Wales, have been cut and faceted into quite large gems of fine quality.

In April, 1969 an interesting specimen found on the flanks of Mount Franklin near Daylesford, Victoria was submitted to the National Museum for identification. It was a nodular body with a maximum diameter of 4½ inches, and proved to be composed mainly of augite. This unusual specimen, discovered by Mr. F. G. Powell of Mount Franklin, was subsequently donated to the Museum.

Mount Franklin is a well preserved volcanic cone formed by explosive activity probably about 20,000 years ago (in late Pleistocene times). Dunn (1912) has recorded the occurrence of occasional nodules of olivine, angular fragments of feldspar and small pieces of augite on the crater rim and slopes of this scoria cone. Coulson (1954) has referred to masses of olivine, masses of augite and large phenocrysts of anorthoclase feldspar in the plug of basalt found in the crater of Mount Franklin.

Most of the augite found loose on the surface and by digging in the scoria (rough, angular pieces of very vesicular basalt) at Mount Franklin is of small size, and the specimen here described is an unusual one. Presum-

Plate 2: Nodule composed mainly of augite from Mount Franklin, near Daylesford, Victoria.

Plate 3: Topaz from Cooyal Crk., near Mudgee, N.S.W. Wt. = 6lb. 6¼ oz.

Photo: E. R. Rotherham

ably it represents a xenolith, ejected with the scoria, which crystallized at a fairly great depth in the earth's crust. This nodular mass shows three plane joint faces in process of rounding; elsewhere it has been fairly well-rounded, presumably from abrasive action within the vent and from partial melting. Under the microscope thin fragments of the augite appear pale greenish to purplish brown in colour, and they are slightly pleochroic.

Xenolithic inclusions are not uncommonly found in Tertiary and Quaternary basalt and basaltic scoria in Eastern and Southern Australia (Green, 1964). Most are composed mainly of olivine, and xenoliths composed mainly of augite are much rarer. Some of the inclusions are lava-encrusted (volcanic bombs) while others are not. Volcanic bombs are not as common at Mount Franklin as at Mount Leura (Camperdown) and certain other volcanic hills in Victoria. They are usually less than 9 inches in maximum dimension at Mount Franklin and most of them have a nucleus or core consisting chiefly of olivine grains.

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Field Naturalists Club of Victoria

General Meeting

12 January

About eighty members were present and the President, Mr. E. R. Allan, was in the chair.

He announced that the Secretary, Mr. David Lee was in hospital. The wishes of the members for his recovery were sent to him.

Members were pleased to hear that both Mr. G. Hooke and Mr. E. Hanks were recovering from their illnesses.

The receipt of Christmas Card greetings was reported. These included those from Sir Rohan and Lady Delacombe, Mammal Survey Group, S.G.A.P. and Ringwood F.N.C. Photoflora notices were received for distribution, the dates of screenings being 2, 3, 4 March in Melbourne, Victorian Youth Club Association Rooms; 1 April at Ringwood; and 4 April at Montmorency. A letter from Mr. Piesse of the Australian Conservation Foundation asked for information of all groups concerned with conservation. This will be published early in 1970 and may be purchased. A reference was made to a sacred aborigine rock at Bald Hill near Clematis, which, it was feared, may have been covered with water from the new dam on Cardinia Creek, but Mr. Massola has been in touch with the M.&M.B.W. and assures the club that it will be clear of the water and on the shores of the lake.

The President announced that nominations for office bearers were to be received at this meeting.

A letter from the Board of Works asks the club to notify them of items of interest, particularly botantical species, in the Yarra Valley.

Mr. D. McInnes asked any members who received 2 copies of December *Naturalist* or 2 copies of January *Naturalist*, instead of one of each, to return one to the treasurer, upon which they will receive the missing one.

The subject for the evening was "Members Night" organized by Mr. J. Strong. Mr. E. Swarbreck showed pictures of the old gold settlement of Whroo now abandoned, and the Namma Water Holes of the aborigines. One picture showed a blazing grass tree set alight by youths who were spoken to by a Field Naturalist Member who was told by a woman to mind his own business. This was reported to the ranger. Some time later it was learned that the ranger had done nothing because the woman was a policeman's wife.

Another picture of Whroo showed eucalypts which appeared to be burnt but were defoliated by cup moth caterpillars—"Chinese junks" which swarmed in countless thousands. Another slide showed a nearby sign "Traction engine drivers are requested to whistle here" a reminder of the old days when horseman could be warned of the approach of the engine so that they could control their frightened horses.

Another slide showed the red prostanthera shown to Mr. Swarbreck by Mr. Ken King. Miss Madge Lester showed fine colour slides of a large golden orb spider in its web on the top of which was a litter of apparent remains of prey. Successive shots showed the small male approaching from above through the litter, very cautiously rushing back when the web was shaken, but returning to put its cusps into an opening in the large body of the female which was hanging as in a trance upside down. After a few seconds the male came down dithering backwards and forwards.

Miss Lester quoted other observers who report that the tiny male makes a small bit of web into which sperm is shed which is then drawn up to the mouth for transferring to the female later.

Miss Jean Woollard showed slides of the Native beech male and female flowers. These may occur on the same tree.

Another slide showed the red bottle brush, *Callistemon citrinus*, which is disappearing in Gippsland due to the systematic burning. Other pictures were of a Goodenia near Lakes Entrance and Caltha flowers at Mt. Buffalo, and fine coast shots of Port Campbell National Park. Miss M. Moon, brought beautiful slides of King's Canyon, includ-

ing masses of *Blennodia canescens* and a Groundsel after rain near Wallaroo Ranch, with an engaging young kangaroo rescued after its mother was shot.

Mulga, thryptomene, cycads, ghost gums and river gums were found in the red canyon with its angle turn, steep sides and domes.

Mrs. E. Bennett showed slides of *Pterostylis curta* which had come up this year in her garden behind a native tea tree hedge amongst moss and kidney weed; the first appearance in over 20 years and now showing 60 plants. She also showed a mass of snow daisies from Mount Hotham, and an interesting series of Curly Kale showing beautiful colours and quaint forms in a suburban garden.

Mr. Alan Morrison showed a series of the green tree ants and nests from the Northern Territory. He explained that these ants with bottle green abdomens are a little smaller than a meal ant and can give a nasty nip. They make their nests from 3 feet to 20 feet up a tree, and the nests are 4-5 inches in diameter. They pull leaves together and workers grip their larvae and move them back and forward between the edges of the leaf while the larvae spin out silk which sticks the edges together. Those larvae then must pupate without a covering cocoon. One picture showed 7 ants taking a piece of aluminium foil from cheese 15 feet up a trunk of a tree. The president thanked the members who gave the talks and Mr. A. Morrison for projecting the slides.

Mr. J. Baines voiced the appreciation of members for Miss Allender's organization of excursions, and noted the honour of M.B.E. conferred on Mr. McKenzie for services to tourism, and whose firm provides the transport for the Club excursions. Miss Allender sent a telegram of congratulations to Mr. McKenzie.

Mr. W. Woollard renewed an appeal for a better public address system in the hall. By a show of hands he gained the members approval for a request to council to act in the matter. Mr. Swarbreck advised an approach to C.S.I.R.O. officials at Highett for advice on the type of address system suitable for the hall.

Mr. J. Baines stressed the threat to the Barrier Reef by the proposed oil drilling of Ampol and a Japanese group not far from Mackay. He pointed out that Californian experts, aware of the Santa Barbara oil spillage, had written to Judith Wright who made a trip here to alert people to try to stop the drilling of the reef which doesn't belong to Queensland, but to the whole of Australia, and the world.

He moved that the Club write to the Premier of Queensland and the Manager of Ampol to prevent the drilling so that the reef will be kept. Mr. Curtis seconded the motion which was carried. Miss Moon suggested writing to the Prime Minister also and Mr. Allan said that the Australian Conservation League and the Prime Minister apear to be against the drilling but there was uncertainty about the rights of the Commonwealth and State Governments.

Nature Notes and Exhibits

Mr. A. J. Swaby brought *Crinum flaccidum* (Murray Darling lily), *Lobelia alata* (angled lobelia) and *Melaleuca longicoma* (W.A.), and rhizomes of *Gahnia radula.*

Mrs. M. North showed Petrified wood, quartz, and jasper from Ela beach Port Moresby; and petrified Kauri gum from North Island, New Zealand.

Mr. Graham Love showed chrysocolla (Kalgoorlie dolomite) from Darwin; martite (pseudomorphing magnetite—Broken Hill); silver, lead, zinc (Onslow); garnet crystals (Broken Hill); glacial tillite (Bacchus Marsh); Au-hematite (Tennant Creek); and Arsenic (Tenterfield) which is so dangerous to mine that miners may only work 2-3 hours each day.

Mr. D. McInnes brought rock from Pretty Valley area quarry showing the gneissic rock with a band of granidiorite 2 feet into it. He also described projecting tubes 3 or 4 inches high that Mr. A. Godward found at Mt. Beauty. These led into tunnels underneath from which large ant workers and soldiers came out.

Mrs. Woollard said that the berries on *Dianella tasmanica* were very good this year.

Some interesting fossils of marine life from Henbury Station Finke River, 90 miles south of Alice Springs were on display.

Hawthorn Junior F.N.C.

ANNUAL REPORT 1969

Key Office Bearers 1969/70.

President: Mr. D. McInnes.

Secretary: Tim Anderson, 1 Doona Ave, Kew.

Treasurer: Jenny Forse.

Editor and Club Recorder: Barry Cooper.

Excursion Secretary: Pam Conder.

Publications Officer: Michael Howes.

Membership showed a slight rise during the year, now being about 150.

Meeting attendances also averaged slightly higher.

Meetings 1969:—

31 January	—	Members' Holiday exhibits night.
28 February	—	"Seals of Western Port", by R. Warneke.
28 March	—	"Tidal Zones along our Sea Shores", by G. Van Rompaey.
2 May	—	"Butterflies", by C. McCubbin.
30 May	—	"Insects and Quarantine", by J. Barnes.
27 June	—	"Caves and Caving", by E. Hamilton-Smith
25 July	—	"The Banksia Family", by F. Rogers.
29 August	—	Celebration of our 26th Birthday.
26 September	—	"Birds of the Seashore", by H. Jarman.
31 October	—	"Whales", by J. Hyett.
5 December	—	"Beetles", by P. Kelly.

The August meeting was also highlighted by colour slides of Club activities in the past few years.

Excursions:—

A record number of field trips were available to members in 1969. These comprised short day or half-day trips, involving car travel; and long nature rambles of up to ten miles.

The first included a number of Geology Group outings which members attended.

1 February—Albert Park Lake (Pond Life)

29 March—Beaumaris (Fossils and Marine Survey).

8 June—Korkuperrimal Creek (Geology Group).

10 August—Coimadai (Geology Group).

7 September—Coldstream (General).

27 September—Laverton (Birds and Pond Life).

9 November—Anakie-Maude (Geology Group).

30 November—Brisbane Ranges (Beetles).

Long walking trips were an innovation in 1969. The trips were originally aimed at providing a different type of outing for older Haw-

thorn Juniors and more energetic F.N.C.V. members. However, many younger Hawthorn Juniors have taken part in the excursions. The Club is grateful to Mr. T Sault, whose enthusiasm has contributed largely to the success of these trips held so far.

Outings organized were:—

2 March—Moorooduc-Mt. Eliza area.

4 May—Diamond Creek-Hurstbridge.

14 December—Cape Schank-Rye Back Beach.

The Club is now planning a five day camp for next Easter, visiting Wyperfield National Park and the Little Desert.

Publications:

The Club Magazine, "The Junior Naturalist", has completed Vol. 5. It was again re-organized at the beginning of the year, due to Postal registration. Because of stocks on hand, no new booklets were produced during the year. However, at least three new publications are planned.

In May, Council appointed Michael Howes as the Club's first Publications Officer. Following success at the Nature Show, Michael now also sells nature books, through arrangement with the F.N.C.V.

Nature Show:—

The club organized the following exhibits in the 1969 show:—

Embedding specimens in Plastic—X-ray Animals—Ants (all by Jenny Forse). Skulls—Reptiles (both by John Bevan and Stephen Wilson). Gem Cutting (Gary Wallis). Plant Sectioning (Carl Meyer). Tektites (Barry Cooper).

The Show was most successful for the Club, as there was almost a complete sell-out of publication stocks on hand.

Subscription Concession:—

The Club has introduced a Magazine subscription of 30 cents per annum. Membership fees remain at 80 cents for Juniors and $1.20 for Adults per annum.

Office Bearer Changes:—

The Club lost the services of Susan Beattie and Ian Knox as Secretary and Excursion Secretary during the year. The task of Secretary was divided, Rosalind St. Clair undertaking to mail "The Junior Naturalist". Alan Burns was appointed Assistant Editor.

In July, the Club honoured its President, Mr. D. McInnes, with life membership for outstanding service.

F.N.C.V. PUBLICATIONS AVAILABLE FOR PURCHASE

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield.
The 116 species known and described, and illustrated by line drawings, and 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis.
This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK, by J. R. Garnet.
Coloured frontispiece, 23 half-tone, 100 line drawings of plants and a map. Price $1.50.

Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, Victoria.
Payments should include postage (9c on single copy).

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9 February—At national Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—"Through the Kimberleys" by Mr. Alan Morrison.
4. New Members
   Those elected during Dec. and Jan., together with those elected in Feb. will be listed in the March **Vict. Nat.**
5. General Business.
6. Nature Notes and Exhibits.

Wednesday, 11 March—Annual Meeting.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated).

Thursday, 12 February—Botany Group. Identification of Western Australian wildflowers on slides. Would members with good, correctly named slides, bring a selection to be shown first so that those with unidentified slides of the same species can name them. If time allows, these will be followed by un-named slides, and an attempt made to identify them. Books or hand viewers may also prove helpful.

Wednesday, 18 February—Microscopical Group.

Friday, 27 February—Hawthorn Junior F.N.C. at 8 p.m. in Hawthorn Town Hall.

Monday, 2 March—Entomology and Marine Biology at 8 p.m. in National Museum, Russell Street, Melb.

Wednesday, 4 March—Geology Group.

Thursday, 5 March—Mammal Survey Group at Sir Arthur Rylah Institute for Environmental Research, corner of Brown St. and Stradbroke Ave., Heidelberg.

Friday, 6 March—Montmorency District Junior F.N.C. at Scout Hall, Petrie Park, Montmorency.

F.N.C.V. EXCURSIONS

Sunday, 15 February—Sorrento area. Subject—Marine Biology. Leader Dr. Brian Smith. Coach leaves from Batman Ave. at 9.30 a.m. Fare $1.50. Bring 2 meals.

Good Friday, 27 March to Monday, 30 March—Warrnambool. A coach has been chartered for the period, and accommodation booked. Coach fare $15.00 should be paid when booking. Motel, D.B.B. $6.50 per day (individual payment). Cheques for coach to be made out to Excursion Trust.

Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

FORESTS COMMISSION VICTORIA

. . . . . preserving the beauty of our forests for your enjoyment.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:
His Excellency Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1969/70

President:
Mr. E. R. ALLAN

Vice-President: Mr. T. SAULT

Hon. Secretary: Mr. D. LEE, 15 Springvale Road, Springvale (546 7724).

Hon. Treasurer: Mr. D. E. McINNES, 129 Waverley Road, East Malvern 3145 (211 2427).

Hon. Editor: Mr. G. M. WARD, 54 St. James Road, Heidelberg 3084.

Hon. Librarian: Mr. P. KELLY, c/o National Herbarium. The Domain, South Yarra 3141.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: Mrs. N. E. LEWIS, 1 Billing Street, Springvale 3171 (546 4649).

Sales Officer: Mr. B. FUHRER, 25 Sunhill Avenue, North Ringwood, 3134.

Group Secretaries:

Botany: Miss M. BUTCHART, 23 Loch Street, Hawthorn East 3123 (82 1616).

Geology: Mr. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: Mr. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mr. P. Homan, 40 Howard Street, Reservoir 3073.

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1969

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: P. Gahan

F.N.C.V.

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Sooty Owl (*Tyto tenebricosa*). Photographed near the Atherton tablelands, Northeast Queensland. (Bird captured as nestling; kept in captivity). Photo: Graham Pizzey.

Natural History Features of North-West Australia

October 1969

BY ELIZABETH K. TURNER

NORTHWARDS FROM THE GOLFIELDS INTO THE MULGA

Drought conditions prevailed over this fascinating land, as I entered it on 1 October, via Kalgoolie, Menzies, Leonora, Agnew then N.W. to Mt. Magnet, in a comfortable bus, in the company of 27 other "conservationists" from N.S.W. and Victoria.

We travelled north over flat red loam covered with an icing of bluish iron-stone gravel.

At first there were numerous Salmon gums (*Eucalyptus salmonophloia*) and white-stemmed Mallees, varieties of saltbush (*Kochia* and *Atriplex* sp.) and stands of Mulga (*Acacia aneura*) with silver-grey narrow leaves all held erect to deflect the sunlight, whereas the Wilga (*Geijera*) which attains a somewhat similar height and appearance, had leaves which pointed downwards.

None of the ten different varieties of Mulga were in flower, but later at Wilgia Mia in the Weld ranges we were able to find a few rare trees with seed. There was also a fascinating species of *Minnieritchie* with dark-red bark which peeled in short curls.

A couple of miles south of Leonora we passed the old Sons of Gwalia mine and discovered that Herbert Hoover later to become President of the U.S.A. was one of the first mine managers there in 1897-8. His house still stands and the sideboard from this house complete with carved wooden eagle is proudly displayed in one of the public rooms of the Meekathara Hotel. Hoover's mining engineer, Agnew, is commemorated a few miles further north by a town site consisting principally of a dilapidated public house that refused to sell drinks to a thirsty bus load twenty minutes before official trading hours.

The country surrounding these mining areas was earlier severely denuded of vegetation to feed the gold batteries yet we saw numerous wattles in flower and there were stands of the Bell-fruit tree (*Codonocarpus cotinifolius*) and *Casurina cristata. Duboisia hopwoodii* was found in flower and some spectacular bushes of yellow *Cassia pleurocarpa* and gold and red *Petalostyles millefolium* as well as mauve flowers of *Hemigenia dielsii,* and several species of *Eremophila.*

At an abandoned gold mine we stopped to collect rose and orange quartz, green chrysoprase and pieces of opalite and chalcedony and moss agate; while nearby was a very large tree, eremophila (*E. platycalyx*) from which most of the white corollas had fallen leaving rose-red calyces; indeed eremophila in lilac, white, red and often spotted varieties were probably the most spectacular plants for the next 500 miles.

Our first overnight camp was on the red sand about 10 miles north of Menzies, and near a large Rottnest Pine (*Callitris preissii*).

Here we were awakened by that most melodious of all Australian songsters, the Pied Butcher bird, (*Cracticus nicrogularis*) who seems to test each rich flute-like note for intensity and echo-quality.

At Mt. Magnet the garage attendant told us they had received only 3 inches of rain in the last eleven months but this did not deter the Mullamullas in pink (*Ptilotus rotundofolius*) and in mauve (*P. exaltus*) from growing along the dusty road side.

Between Mt. Magnet and Cue there is a wide salt lake named Lake Austin, which was dry and covered with salt crystals which had blown on to the surrounding dry country. This area was devoid of vegetation except for the eremophilas, cassias and ptilotis.

Near dry water courses we welcomed the shade of River Red gums (*E. camaldulensis*) and amongst the mulga we sometimes found Wild Orange (*Capparis lasiantha*) in flower.

Red-fruited Quandong (*Santalum acuminatum*) was observed and we began here to see our first Snappy Gums (*E. brevifolia*) of which we saw more as we drove north.

Occasional bushes of the Yellow Pennant (*Loudonia roeii*) lined the road and there was a showy Grevillea (*G. juncifolia*) with golden flower spikes.

In this so-called Eremean Province, we saw many Red Kangaroos, mostly in the early mornings soon after breaking camp, whilst male emus with large chicks whose plumage had become adult in colour, crossed the road at any time during the day. A large monitor, the Perenti of the Centre, but here known as a Bungarra, gave us a slow-motion demonstration of waggly walking — using the opposite hind and forefeet together at each step. Port Lincoln parrots (*Barnardius zonarius*) seemed to be the only other common bird in this arid region.

At Wilgia Mia, north west of Cue, we visited an ochre mine used for centuries by aborigines and now very close to a newly staked copper and nickel mine. Here we filled our bags with bright green malachite, and the rarer deep-blue azurite (Copper carbonate) all free of charge, whilst at Cue and Meekathara the "rock-hounds" of the party bought samples of local stones including quartzite crystals — smokey coloured, and amethyst, and variously coloured chalcedonies, cherts, jaspers, tourmaline, and delightful powder-green variscite (Hydrous aluminium iron phosphate).

They were also fascinated with the rainbow-coloured Chalcedony, recently discovered at Mooka Station and called Mookaite. Luckily we had a lapidary teacher in the party, and she was kept busy answering queries from the deilghted novices. It seems impossible not to become enthusiastic about rocks and minerals as well as botany in this area of W.A. There was enough water for swimming in the middle branch of the Gascoyne River and near here we stopped to admire an avenue of lilac flowered hibiscus (*H. farragei*).

We Cross the 26th Parallel into the North-West.

40 miles north of Meekathara we crossed the 26th parallel and so officially entered the north-west, according to a wayside notice.

The highest point on the Great Northern Highway (200 feet above sea level) is crossed at the Collier Range, the divide between the Gascoyne and Ashburton watersheds, 160 miles north of Meekathara. This was the first range that one could say somewhat resembled a range, with a few bluffs and breakaways and on the top, a water tank supplied by storm water from wide V shaped corrugated-iron roofs.

Here was a patch of spinifex, and we discovered Corkwood (*Hakea lorea*) in flower, some Ghost gums (*E. gamophylla*) and both lilac and deep-violet forms of Keraudrina, as well as a grey-green and lilac labiate (*Teucrium* sp.) with an aromatic odour.

Near here we also found *Grevillea excelsior* in flower.

Across the Tropic of Capricorn into the Hamersley Iron Province

Our next delightful camp was in the Opthalmia Range, west of Mundiwindi and almost on the Tropic of Capricorn.

Here amongst the Angopheras, Bloodwoods, Snappy Gums, and Whitewoods (*Atalaya hemiglauca*) we slept without tents, beneath a starry sky and a three-quarter moon. The absence of mosquitoes or other insects (except scorpions) was remarkable in the north west.

We were camped on iron-ore deposited in layers in Proteozoic times on top of the Archaen jasperlite of the Hamersley Ranges. This enormous iron province occupies 25,000 square miles of territory forming the watershed between the Fortescue River in the north, and the Ashburton river in the South.

These iron deposits are the largest in the world and lie in an area so desolate and arid, as to be unsuitable for agriculture; the rainfall varies from 3 to 30 inches, but often the total annual fall occurs on one day in summer.

The winter temperature is said to vary from 75° to 85° but in summer it is always above 90°. We found it hot, and 105° nearer the coast.

One of the party had an electric torch with a magnetized patch along the side and when she picked this up from the ground, iron particles were adhering in rust-coloured strands, like coconut fibre, to the patch.

Next morning we drove into the smart new township of Mt. Newman where ore of more than 64% iron is being scooped and blasted from Mt. Whaleback.

The majority of hill summits are gently domed as the name Whaleback suggests, and they represent residuals of an older land surface. This ancient profile has economic significance as most of the large haematite-goethite deposits are found below this surface.

Due to hydration and oxidation over eons of time most of the iron-ore is not magnetic now.

We were guided up Mt. Whaleback (2,000 feet high, 5 miles long and three-quarters of a mile wide) on a road with a 7% gradient to allow 120 ton Haul-Paks to carry rock down to the crushing plants.

The view over the Opthalmia ranges from the spinifex covered top of the mountain was extensive and one could see the trucks loading below, on a specially built heavy railway line on which the train travels to Port Hedland 200 odd miles north at a speed

of 35 miles per hour, "no more, no less" said our guide.

In some areas along the mined cliff face, we were able to obtain samples of dark-red jasperlite, banded with whitish dolomite, a kind of limestone.

The Fortescue River Area and Spinifex Country.

On one of the dry branches of the Fortescue River, we found the lilac Native Rose (*Gossypium robinsonii*) and Wild Currant (*Canthium latifolum*). Also there were Cadjeputs, and Native Willows (*Pittosporum phillyraeoides*) and the hairy lion-coloured *Dicrastylis exsuccosa* of the Verbena family. Here we also saw a small rock wallaby with a black tip to his upcurled tail.

North of the Hamersleys the plain was covered with small shrubs and spinifex (*Triodia pungens*) in flower and always along the horizon it was possible to see grey or red spirals of Willy-Willys ascending thousands of feet into the blue.

Streams have deeply dissected the old land surface of the Hamersleys and the present streams exhibit "valley-in-valley" shape with steep-walled gorges such as those at Wittenoom and Dale gorges where active headward erosion is proceeding at the present time.

Yampire Gorge looked bright russet-red banded with the straw-yellow of the spinifex; here we obtained Blue Asbestos (*Crocidolite*) from an old mine and we saw the red-flowered Holly-leaved Grevillea (*G. wickhamii*) and the white-flowered variety (*G. pyramidalis*) also bushes of Petalostyles, and Cassia (*C. pruninosa*) as well as many varieties of Ptilotus. Here we photographed two white trunks of *E. camaldulensis* conjoined by a stout horizontal trunk about 15 feet up.

We camped on the pebble-strewn cliff overlooking Dale Gorge, and spent most of the next morning swimming in the deep pool below the Fortescue falls.

Festooning the wet, rocky walls, was the large maiden-hair fern (*Adiantum hispidulum*) and *Cyclosorus gongylodes*. There was also the Caustic Vine (*Sarcostemma australe*) and an attractive creeping Stylidium with bright pink petals, edged with paler pink; an intense blue lobelia, (*L. heterophylla*) and a deep-purple hairy Pityrodia. We also met for the first time a sky-blue flowered member of the Borage family (*Tricodesma zeylanicum*) which we later discovered was common in the north west.

Unfortunately, large deposits of pisolitic (pea-sized) limonitic ($2Fe_2O_3$-$3H_2O$) ore deposits occur along the branches of the Fortescue River, including Dale Gorge, and the Circular Pool, and the alluvium-filled valleys beneath the recent detrital veneer; however we hope that the remoteness of this area from the coast may protect these beauty spots from the ore-hungry industrialists.

The cappings of mesas and terraces in the low-gradient valleys are of similar ore, which occurs in practically all drainage systems which rise in these mountains, and is already being mined at Mt. Enid on the Robe River to the north west.

Bird-life in these gorges was fairly prolific; we saw Golden Whistlers, Pied Butcher-Birds, small doves, the Forest Kingfisher and numerous finches.

The township of Wittenoom is about 33 miles north west of Yampire

Gorge and stands on the flat at the entrance to the Gorge.

The cliffs rise 800 feet above the town which at present is showing signs of decay, many houses being abandoned since the closure of the asbestos mine.

Mr. Lang Hancock who owns nearby Mulga Downs and who was the discoverer of iron in this area, has now, with Mr. Wright, formed Hanwright Pty. Ltd. and hope for future employment is returned to the remaining inhabitants of Wittenoom.

Outside the old mine gates are piles of asbestos tailings with a notice erected by the Department of Health warning people against their removal: Asbestosis of the lungs is one of the most dangerous of the chronic inhalational diseases.

George Hancock, the father of the present multi-millionaire Lang, named the gorge after the Wittenoom family, original owners of Mulga Downs.

A few miles north west along the Fortescue River valley, brought us to the narrow Rio Tinto gorge road which leads to Mt. Tom Price.

We turned east for our camp at Hamersley Gorge where the rock colours in the setting sun were more fantastically brilliant than those of Central Australia, and large, red termite mounds resembled the microcephalic torsos of Henry Moore statues.

In the cooler, shaded areas of the Gorge we found fern grottos, Cadjeputs, yellow Hibiscus with a crimson centre (*H. panduriformis*) and an apricot coloured flowering *Corchorus pachyllus* as well as River Gums and Snappy Gums.

Mt. Tom Price is another modern town with air-conditioning shopping complex, and fountains of water playing over rocks in the Square. It is actually situated below Mount Nameless and some miles from the mining area thus avoiding the dust problem which afflicts Mt. Newman when the wind blows in a certain direction.

Some miles north of Mt. Tom Price and in front of Hamersley Station near Mt. McRae we punctured a tyre, and thus had our lunch on a shadeless red gibber plain where the rocks were too hot to pick up.

From here we followed beside the Hamersley Iron Company's standard gauge railway out towards the coast, which it reaches after 179 miles at Dampier on King Bay.

Millstream – an Oasis Along the Fortescue

Further west along the valley we turned south to Millstream, where a warm spring upstream in the Fortescue River is said to supply twelve million gallons of clear water per day.

Giant Cadjeputs (*Melaleuca leucadendron*) formed cool shade and luxuriant vegetation lined the banks of the deep clear water in which fish could be seen.

After digging trenches in the heat to bury piles of empty tins and bottles, left by previous visitors, our conscientious but hot and annoyed travellers swung out into the river by means of a rope tied to an overhanging Paperbark. The splash of the first swimmer caused a flight of corellas to leave screaming, and some black swans hurriedly vacated the oasis while a duck honked off upstream; but a courageous black cormorant sat unconcernedly with outstretched wings on a snag near the opposite bank.

Some 'campers' discovered some nasty-looking scorpions under their sleeping-bags next morning, but fortunately no-one was bitten.

Is it possible for birds to mistake moonrise for dawn?

I think the corellas did, as at 1.45 a.m. when the moon rose they all woke up and began their feeble, complaining gargles, and the swans flew back to the water. At 'Picaninny' daylight some ibis arrived and the cadjeputs were soon alive with small green honey-eaters with white eyes.

Along the north bank we examined the Native Cabbage Palm (*Livistonia alfredii*) and near where we slept there grew a large tree with enormous white pea flowers (*Sesbania formosa*) and wild figs grew on the high red laterite cliffs of the south bank.

North to the Coast

Travelling north we reached the edge of the Hamersley escarpment below Mt. Herbert, and near the road we found Python Pool in which we gratefully plunged to assuage the heat. Further north we passed the fantastic Pyramid and other mesas and noted the patches of black cracked rock on which no spinifex grew, giving an appearance of recent burning.

Roebourne seemed to consist of a few tin roofs battened down with iron rods against the cyclones; pitiful but neat gardens surrounded the houses and in the streets there were bushes of Lachnostachys, and a form of the Rottnest Daisy, with white flowers (*Trachymene glaucifolia*).

Across the dry bed of the Harding River were neat cottages inhabited by aboriginals, but their grounds were cluttered with refuse and junk of all kinds, including broken-down motor vehicles and there was never an attempt at any gardens. The hotel bar was moderately cool but the fierce dry heat outside registered 105°.

A Ghost Town Visited

Across the mangrove flats we found the ghost town of Cossack, formerly Tsien-Tsien, established in 1863, where fine stone buildings stand hollow and deserted facing a well-built stone wharf abutting on the blue sea. We longed for a cool plunge, but were warned that bathing is unsafe because of sea-wasps, stone-fish and sharks.

The mangroves are of two kinds, one with stilt-like roots (*Rhizophora mucronata*) and the other with upright pneumataphores poking out of the mud (*Avicennia marina*). One of the party saw a mud-skipping fish on the mangrove flats.

We visited the neglected cemetery where Rattlepods (*Crotalaria* sp.) grew. One headstone was in memory of a doctor who died on board the ship Saladin in 1893, another was to the memory of the pioneers who had so courageously settled in this area. In 1904 there were still 150 people at Cossack, but then Point Samson became the port for shipment of asbestos from Wittenoom.

At Point Samson we saw the typically long pier so necessary in the north because of the tremendous tides; from here some copper and wool is still shipped. Nearby there is a small new settlement of the British Oil Corporation.

The North West Coastal Highway

The coast along the north west is flat; mud and mangrove merge with spinifex and red sand; beside the road are red-black mounds of cracked ironstone rock. This cracking looks like the hand of man but must be due to the natural forces of baking in the sun by day and sudden cooling during the night.

Dampier is about 30 miles west of Roebourne, and is 'Mt. Tom Price by-the-sea', as our driver so aptly said. The houses are of new brick with tiled red roofs but no guttering. It is said that each householder receives a lawn-mower as part of his equipment to encourage the planting of lawns. There is an air-conditioned shopping complex with water with which we were able to replenish our depleted drinking vessels.

There was a deep-water harbour and a Japanese boat was loading iron ore from Mt. Tom Price after it had been further crushed to about quarter inch size. More than 20,000 tons per day are shipped from here at present and the amount will increase. Hamersley Iron Pty. Ltd. plans to build here the largest metallised agglomerate plant in the world.

A few miles further west we found a patch of melaleucas and a few eucalypts beside a sluggish, reedy river —the Maitland, source of Dampier's present water supply. One of the party caught a large catfish with long whiskers here.

We slept in lines like a dormitory on the red dusty banks of the river which provided fairly level ground; a faint pump worked further upstream and due to our proximity to the sea a dew descended overnight causing the red dust to set in small cakes on our sleeping gear.

The vegetation along the coast is rather uninspiring It consists of some patches of acacia, some grevilleas, corkwoods and eremophilas, and lots of ptilotis, mostly pale yellow-green, but as we again crossed the Fortescue River we came upon a magnificent bean-tree (*Erythrina verspertilio*) covered with scarlet flowers.

Near Yarraloola we crossed the Robe River which drains the Brockman Iron Formation including Tom Price. This western end of the Hamersleys seems to contain the most extensive deposits of pisolitic iron measurable in thousands of millions of tons of ore containing more than 50% iron.

These deposits are terraced along the walls of the narrow gorges, where pisoliths are often mixed with haematite-goethite conglomerate.

The pisolite also caps the mesas in a thickness of about 50 feet and can be seen as a dark spinifex free cap.

Pisolitic ore in this area is said to be higher in silica and alumina than the haematite ore at Tom Price but is lower in phosphorus; it is believed that pisolitic ore represents the end-product of weathering and desilication of jasperlite transported down the river systems, during the long period of erosion.

Into the Ashburton District Again

Duck Creek drains the western Hamersleys to the south, before flowing into the Ashburton. This area also has similar pisolitic ore deposits.

We by-passed Onslow, which was said to be 'very like Roebourne' by leaving the coastal highway at Peedamullah and passing through Nanutarra where the Ashburton River is crossed, and here were some River Gums (*E. camaldulensis*), Snappy Gums (*E. brevifolia*) and several others. The flat red plains were often covered with Mitchell Grass (*Astrebla pectinata*) and were said to carry a few sheep. There were no fences, however, and this area has a summer rainfall of less than ten inches and looks like it! We saw stands of Mulga (*A. aneura*)

and occasional Whitewoods (*Atalya hemiglauca*) and Ironwoods (*A. estrophrolata*).

Around Yannarie we passed through Coolibah country (*E. microtheca*) and saw a few brown-centred Sturt's Desert Pea.

South from the Tropics

Just north of the Minilya River the road crosses the tropic of Capricorn and leaves the spinifex plains for a mixed wattle scrub We passed through a series of red sand hills which were most floriferous and it would have been interesting to have explored every one — as it was, we found pink feather-flower (*Verticordia forrestii*), blue hibiscus (*Pinonianis*), the calyces only of pink calythrix mucronata, as well as white grevillea (*G. pyramidalis*) and golden *Grevillea stenobotrya*, and furry lilac *Pityrodia loxocarpa*.

Near the river we discovered a small air-conditioned road house selling iced drinks and we descended like locusts and drank and drank.

South of the river the road was sealed and we made the 91 miles into a caravan park at Carnarvon in 1 hour and 20 minutes. All that I managed to see was the wide, sandy waterless bed of the Gascoyne River, where small 'spear' pumps are used to tap the millions of gallons of fresh water below the sand to maintain heavily-planted banana plantations, which grow on the flats here, not on hill slopes as at Coffs Harbour, N.S.W.

The big 'dish' of the satellite tracking station is visible from a long way out on the plains; next day we toured the station which is built on a series of low red sandhills called the Brown range. They told us that Carnarvon is exactly 180° from Cape Kennedy, U.S.A., and that a hole bored directly down through the earth's centre would come out here.

Carnarvon to Shark Bay

The road south ran straight along a hot sandy saltmarsh, with some mulga scrub for about 120 miles when we re-crossed the 26th Parallel and so officially left the north-west. At the 490 mile post we found another road house and repeated the locust act. Here was a solar distilling plant for the production of fresh water from salt water and the outhouses were made of blocks of white shell-conglomerate which we later found was cut from the dunes of Hamelin Pool which forms the eastern arm of Shark Bay where we made our next camp.

Near the Hamelin Pool Station homestead is an artesian bore which has formed a fresh water lake surrounded by vegetation. Here we saw swans and their cygnets, pied duck, banded stilts, and silver gulls, and lying about were bubbly looking red stones, which when cracked revealed rainbow chalcedony, some with red blood-like veins

To our surprise we found a lonely post-office behind the dunes and on asking the Postmistress why a post-office should be situated there, she said she had no idea, but it had been there for 80 years.

The sea at Hamelin Pool was very shallow and salty and a white cloudy flocculate formed with each step. We were warned about sea-serpents and so did not venture further than a cooling dip in the shallows. There was a hot breeze at night as we slept on the dunes and at dawn some small invisible birds in the coastal vegetation called to each other very distinctly 'I said I would do it'!

South to the Heath Scrub of Kalbarri

As we drove south towards the Murchison River crossing at Galena, the sand-plain flora began to appear. There were waving pale yellow *Grevillea leucopteris,* orange *Grevillea eriostachya,* and whitish *Grevillea dielsiana;* the Acorn Banksia (*B. prionites*), blue dampiera sp. and scaevola and copper cups (*Pileanthus peduncularis*). There were bushes of apricot and green geleznowia, lilac hibiscus, red calothamnus and sheets of pink *Helichrysum casiniana,* and some almost dead yellow and white cephalipterum.

Conclusion

Our next night was spent at Red Bluff on the coast a few miles south of Kalbarri, where the flora of the sandy scrub is so abundant, colourful and exciting that a whole article could be written on this area alone.

As I anticipate that such an article will be forthcoming from members of the F.N.C.V. who visited this area about one week previously, I shall bring my journal of the amazing north west to its conclusion.

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Botany Group Announcements

Thursday, 12 March.

Speaker: Mr. J. Willis.

Subject: Botanical Personalities of Australia.

Thursday, 9 April.

Speaker: Miss M. Lester.

Subject: Myrtaceae.

Excursions

Sunday, 8 March.

Mt. Ben Cairn (Healesville to Mt. Donnabuang Road). Meet at Healesville Comfort Station at 10.30 a.m.

Preliminary Notice

Sunday, 12 April.

Macedon area. Details and time to be arranged at March meeting of Botany Group.

Geology Group Excursions

Sunday, 22 March—Geology Group Excursion to Tullamarine (Albion—Reid's Quarries) and Bulla (Deep Creek). Leader—Mr. R. R. Dodds. Transport by private car (spare seats available). Leave Flinders Street, opposite C.T.A. Building, at 9.30 a.m. Bring one meal.

Sunday, 5 April—Geology Group Excursion to Waurn Ponds (limestone quarry) and other localities in Geelong area. Leader—Mr. Stan Rowe. Transport by private car (spare seats available). Leave Flinders Street opposite C.T.A. Building at 9.30 a.m. Bring one meal.

Sunday, 10 May—Geology Group Excursion along Maribyrnong River. Leader—Mr. D. McInnes. Transport by private car (spare seats available). Leave Flinders Street, opposite C.T.A. Building at 9.30 a.m. Bring one meal.

Ninetieth Annual Report

1969

Field Naturalists Club of Victoria

Nineteen sixty nine will go down as the year that conservation came of age, and was seen by government and politicians as having magical associations with the people and the polls.

The public have suddenly become aware of the fast vanishing bushland and in this awareness make demands that find us hard-put to maintain a balance between the study of natural history and conservation and its various campaigns. It was expected that we would give advice; expected that we would have a part to play.

Indeed it was ever so: ninety years of study, publishing, and advising have made us Nature's *Alma Mater.*

Inevitably secretarial duties have suffered, and reconstruction of the organisation will be necessary to meet the challenge that care of the environment and the study of ecology will impose. More Group Projects are needed; more leaders and an eagerness on the part of members to come forward and be counted among the active ones.

Membership

Ordinary members 440, Country 240, Juniors 18, Subscribers 144, Affiliated Clubs 29.

Of special interest is the entry of the La Trobe University Conservation Society into the ranks of affiliated clubs and we wish them well for the future. Of particular sadness was the death of Mr. R. W. McKellar who together with his wife had for a number of years been on the committee of the Churchill National Park; and the passing of Mr. K. C. Halafoff, a constant contributor to the magazine. He was well known for his articles on Lyre Birds.

Congratulations go to Mr. Bond and Miss Missen for achieving Honorary Membership.

Books

This year saw the success of *Flowers and Plants of Victoria.* Published by A. H. & A. W. Reeds in association with the F.N.C.V. it has added to our funds considerably, and our congratulations go to the co-authors Messrs. Cochrane, Fuhrer, Rotherham and Willis. Also out this year, published by ourselves, was an index to Vol. 1 & 2 of *Wildlife* at 30 cents.

In the melting pot are further books, two on flora and one on birds.

Nature Show

Held in conjunction with the S.G.A.P. and B.O.C., this was as popular as ever and eagerly looked forward to by a large number of people. 3813 adults and 3095 children went through the turnstiles. This was a far larger attendance than the previous year which had been affected by the opening of the new art centre.

The Bird Observers had the responsibility of the three dioramas which were the central attraction, the theme of which was 'Birds of Melbourne Suburban Home Gardens', 'Birds of the Botanical Gardens', 'Birds of the Beaches'.

Of special interest was the number of junior clubs taking part. As well as the well established Hawthorn Juniors there are the up and coming Preston, the newly formed Montmorency, and the small but vigorous Pascoe Vale clubs. The display of native plants in flower was, as always, tremendous.

Medallion

The committee revised the rules to facilitate the administration of the award and it will now be possible to make the award at a set time of the year at the November General Meeting in Melbourne. The 1968 award was made to Dr. Norman B. Tindale, formerly Curator of Anthropology at the South Australian Museum and visiting Professor at the University of California.

The 1969 award went to Charles A. Gardner of Western Australia, and it is unfortunate that he has had to forego the traditional award ceremony. He was formerly Government Botanist.

Wildlife & Conservation

As usual we have been dividing our activities between the two. Again we appear to have been successful in keeping the Wombat off the vermin list, while at the same time came the welcome news that that awful pest *Chrysanthmoides monoliferium* (South African Bone Seed — Jungle Weed), or whatever you like to call it, has at long last been put on the list of noxious weeds. Our concern at the moment is for some of the smaller animals like Mitchell's Hopping Mouse, which may be in danger because of recent popularity in the press. We have even heard of people digging up their habitat just to photograph them. We also hope to get the locality of the recently rediscovered orchid *Calochilus richae* protected (reference November *Naturalist*).

The success of the Little Desert issue could well have strengthened conservation, by leaving as a legacy the Bushlands Action Committee, and The Conservation Advisory Panel, which together with the newly formed Conservation Council of Victoria, make an impressive line up for the future. However, let us not feel complacent; the Glenelg still needs to be resolved and a new National Park an urgent requirement for our Alpine areas. Other issues still to be resolved are Warrandyte State Park; Gemmells Swamp, a major breeding ground for the Ibis; and Parks for the Brisbane and Otway Ranges to mention only a few.

For the future here is the question put to an overseas conservation panel discussing the Politics of Ecology. The answers may well have an application here.

"What specifically, can the concerned citizen do?"

The Panel agreed on the following:

Stop acting as an individual.

Environmental problems are still so new as political issues that they must be patiently explained to legislators — preferably before formal hearings. Every environmental cause must be directly equated with votes for the legislators.

Proposals should call for positive action rather than negative action.

Once bills start moving through the legislative machinery, their progress should be widely publicized.

Library

The library received an unexpected addition with the donation of some parts of Bronofskis 'Birds of Australia', which helps to make the parts that we already have more complete.

This, together with the gift of a volume of Cassels 'Birds', came from Mr. S. M. Callaghan of Lorne.

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

FIELD NATURALISTS CLUB OF VICTORIA BALANCE SHEET AT 31st DECEMBER, 1969

Liabilities

Year 1968			
$401	Subscriptions paid in advance		$404
133	Sundry Creditors		—
58	M.A. Ingram Trust grant in hand		385
	Special Funds and Accounts—		
3,104	Building Fund	$3,103	
4,298	Publications Fund	4,516	
100	Library Fund	100	
538	Club Improvement Account	1,037	
200	Excursion Account	200	
5,217	Estate Marion Wright Legacy	5,217	
418	Estate Ruby A. Lewis Legacy	418	
200	Estate Miss I. F. Knox Legacy	200	
1,048	Microscope Project Account	1,060	
1,164	Flower Book Account	1,966	
			17,817
6,547	Surplus of Assets over Liabilities		5,857
$23,426			$24,463

Assets

Year 1968			
$3,378	Cash at Bank	$3,038	
1,396	Sundry Debtors	957	
47	Badges and car stickers on hand at cost	34	
136	Microscope Project Stock at cost	151	
538	Books on hand for sale at cost	635	
517	Flower Book Stock at cost	100	
			$4,915
4,572	Library Furniture & Equipment at cost		4,739
	Investment of Funds—		
	Publications Fund—		
2,200	Commonwealth Bonds at cost	$1,800	
	Stocks valued at cost—		
231	Victorian Ferns	139	
834	Victorian Toadstools	738	
603	Wyperfeld National Park	505	
53	Sundry Debtor	54	
377	Cash at Bank	1,280	
			4,516
	Building Fund—		
2,100	Commonwealth Bonds at cost	$2,100	
1,000	State Electricity Commission Stock at Par	1,000	
4	Cash at Bank	3	
			3,103
	Library Fund—		
100	Commonwealth Bonds at cost		100
	Legacy Estate Marion Wright—		
5,200	Commonwealth Bonds at cost		5,200
140	Cosstick Reserve — Maryborough —at cost		140
	Flower Book Account—		
—	Commonwealth Bonds at cost		1,750
$23,426			$24,463

We report that in our opinion the accompanying Balance Sheet and accounts of the Field Naturalists Club of Victoria are properly drawn up in accordance with the provisions of the Companies act 1961 and so as to give a true and fair view of the state of the Club's affairs at 31st December, 1969, and of its operations for the year ended on that date, and that the accounting and other records examined by us have been properly kept in accordance with the provisions of the Act.

Melbourne
9th February, 1970

Signed:
Danby Bland & Co.
Chartered Accountants
Auditors

FIELD NATURALISTS CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF RECEIPTS & PAYMENTS FOR THE YEAR ENDED 31st DECEMBER, 1969

Receipts

Year 1968			
	Subscriptions Received—		
$69	Arrears	$162	
5,760	Current	5,327	
96	Supporting	130	
			$5,619
370	Sales of Victorian Naturalist		313
279	Advertising in Victorian Naturalist		113
	Interest Received—		
5	Library Fund	5	
167	Bank Account	173	
221	Investment on M. Wright Legacy	221	
			399
135	Sundry Income		64
227	Amount transferred from Building Fund A/c. for payment of part rent		155
—	Deficit for year		694
$7,329			$7,357

Payments

Year 1968				
	Victorian Naturalist—			
$4,018	Printing		$4,445	
1,040	Illustrating		1,015	
368	Despatching		319	
45	Editorial Expenses		20	
			$5,799	
(743)	Less Ingram Trust Grant		808	
				$4,991
	Working Expenses—			
170	Postage & Telephone		$177	
94	Printing & Stationery		279	
40	Rent of Room for Storage		40	
95	General Expenses		51	
14	Affiliation Fees, Subscriptions & Donations		141	
18	Preston Junior Club Rent		19	
42	Natural History Medallion Expenses		141	
750	Typing & Clerical Assistance		1,169	
50	Audit		50	
337	Mammal Survey Group Expenses	$85		
(337)	Less Ingram Trust Grant	85	—	
		—		2,067
227	Rent of Hall & Library			244
57	Insurance			55
1,044	Surplus for year			—
$7,329				$7,357

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31st December, 1968	$3,104
Interest on Investment and from Bank Account	154
	$3,258
Less Amount transferred to General Account for payment of part rent	155
Amount of Fund at 31st December, 1969	$3,103

PUBLICATIONS FUND

Amount of Fund at 31st December, 1968		$4,298
Surplus for the year from—		
Ferns of Victoria and Tasmania	$34	
Victorian Toadstools and Mushrooms	24	
Vegetation of Wyperfeld National Park	28	
	—	86
Interest on Special Bonds and Bank Account		132
Amount of Fund at 31st December, 1969		$4,516

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 31st December, 1968	$538
Nature Show Profit	400
Profit on Booksales	113
	$1,051
Less Books purchased for Library and 3 spare lamps & 1 projector pointer	14
Amount of Account at 31st December, 1969	$1,037

General Meeting, 9 February

About 190 members and friends attended and the President Mr. E. R. Allan was in the chair.

The minutes of the meetings on 8 December and 12 January were taken as read. The secretary was welcomed back. A letter was received from Mr. E. T. Muir asking the club to take action about making secure the habitat of the Mitchell's hopping mouse which has been relocated in the Little and Big Deserts after it was thought to be extinct. Collectors for export in the Commonwealth and Overseas are securing them and it is feared they may soon exist no longer. They should be on the protected list. Mr. Garnet moved that the matter be taken up by the council for sympathetic consideration. Mr. Swaby seconded the motion. The President said it was for the Chief Secretary's department to consider and to declare

it to be a protected animal. They would refer it to the Fisheries and Wild Life Department. Mrs. Woollard said that one animal had been sent to Melbourne for the Sanctuary but it had been killed and stuffed.

The Secretary has been contacted by Mr. Charles Fleming of Macedon asking for the Club to supply names of members in the Macedon area for help to try to prevent extensive subdivisions in the Macedon region and to help secure a National Park on Mt. Macedon where there are Koalas and natural vegetation.

The F.N.C.V. would like to know where the subdivision is taking place. Anyone living in that area is asked to get in contact with Mr. Fleming.

The Secretary also announced that there is to be a meeting of the Conservation Council of Victoria at Tatura on 25 March to consider making the swamp at Mooroopna into an aquatic sports lake. The Conservation Council appears to hope to get the birds to transfer to another swamp. Two representatives of the F.N.C.V. are invited to the meeting but it is hard to get anyone there at that time to give the Club's views on that regrettable proposal. The President announced that Mr. Ernest H. Homan had been a member of the F.N.C.V. for over 42 years and is President of the Latrobe Valley F.N.C. and formerly of Bairnsdale Club. The Council recommended him for honorary membership. The meeting heartily endorsed this and Mr. Homan was presented with the Certificate of Honorary Membership.

In responding, Mr. Homan recalled the early days in the Wonthaggi district where in the heathland between the road and the sea there were acres of wallflower orchids, numbers of spider orchids, and with Mr. Dick Bond he listed over 90 species of orchids in the district. He found the rare endemic *Thelymitra murdochae*. He joined the club on the proposal of Mr. Pescott, and in Melbourne attended club meetings regularly, and after being in St. Arnaud returned to Gippsland. He was a foundation member of the Bairnsdale Club and is president of the Latrobe Valley Club. He regretted the 1,000 acres of Pinus radiata now in Gippsland. There, no birds sing or flowers grow. He stressed that now is the time for conservation to be active—the main objective of the club.

The President then gave his last report as follows:—

As this is the last meeting of the Club which I shall attend this year, and as your retiring President, I thought that perhaps it would be appropriate if I made a few remarks on the affairs of the Club at this point.

I think that we have once again had a successful year of activity in 1969. Our General Meetings attended usually by approximately 150 members and visitors have covered a wide variety of subjects, and the exhibits have been interesting and informative.

The five Club Groups—covering Botany, Geology, Microscopical Research, Mammal Survey, Entomology and Marine Biology, have each held regular monthly meetings and many field excursions.

We have had general Club excursions to 17 different places, including one to W.A. and one to Mt. Beauty, all of great interest and enjoyed by members, apart perhaps from the one to Churchill National Park.

We held our Annual Native Show at the Lower Melbourne Town Hall,

and once again it was a great success—an innovation being the B.O.C's staging of the central exhibit and making a very good job of it.

We have continued to publish the *Victorian Naturalist,* maintaining its high standard of articles and format. A change of printers occurred owing to a considerable increase in charges by Brown Prior Anderson who have printed the Naturalist for us for the past 38 years. After a considerable amount of investigation and discussion by a sub-committee set up by Council arrangements were made with Jenkin, Buxton & Co. to print the *Victorian Naturalist* at approximately the same cost as applied before the increase made by Brown Prior. The Club is deeply indebted to Mr. Grif Ward, our Editor, who negotiated with the firm and who took such care to have the change-over occur with the minimum of inconvenience to the Club. However Council is concerned at the strain this publication makes on the Club finances despite a subsidy from the M. A. Ingram Trust. The high rate of subscription necessary to cover printing costs has I believe resulted in some members feeling compelled to resign. It may well be that before long, we shall be compelled to cease the monthly publication which has continued virtually unbroken for the past 87 years—a great achievement—and perhaps issue the Naturalist every two months instead of monthly.

In co-operation with other organisations we have endeavoured to carry out the other part of the objects of this Club—i.e., to preserve and protect Australian Fauna and Flora, notably in respect of proposed Lower Glenelg National Park, Little Desert, Warrandyte Reserve, Glenwills Swamp and others.

The M. A. Ingram Trust, of which three members of this Club are Trustees, has arranged to pay the cost of over 3,000 acres of virgin Mallee country at Wandown, east of Annuello. This is the last remaining area of Mallee in five thousand square miles of sheep and wheat farms in Swan Hill Shire and the purpose will primarily be to preserve the Lowan. In a survey conducted by the Mid-Murray F.N.C., over 70 mounds were found—21 of them working. This was in June last year, but of course it will provide a sanctuary for emus, parrots, and many other species.

Having regard to the foregoing, and I haven't covered everything, no one could say that we are not an active Club, and I feel that all of you who have contributed in any way, however small to what we have achieved, are to be congratulated and thanked, but particularly our Secretary, Treasurer, Editor and Excursion Secretary.

We could do with more young people having a say in Club affairs, and perhaps next year members will look around to see which of our younger members could be elected to Council.

In conclusion I should like to thank you for doing me the honour of being your President. Although I haven't been able to participate in the Club's activities as much as I had hoped it has been a privilege to be President of the F.N.C.V.

All good wishes for greater success in 1970.

The Secretary reported that Mr. Charles Gardiner was still so ill, there was no hope of a bedside ceremony to present the 1967 Medallion, but he had been made aware of the award.

The subject for the evening was "Through the Kimberleys" by Mr. Alan Morrison. A map showed the

extent of the 10,000 mile trip for three cars and two caravans, taking three months, through Port Augusta, Alice Springs, Devil's Marbles, Mataranka, Darwin, back to Katharine, Timber Creek, Kununurra, Hall's Creek, Fitzroy Crossing, Geike Gorge, Broome, Pt. Hedland, Marble Bar, Millstream, Carnarvon, Geraldton, Mt. Magnet, and back to Jurien Bay. Excellent colour slides showed the diversity of the changing scene, from the silicious jasper and agate gibber stones, bright pink Euphorbia and Frankenia flowers, dry water courses with River Red-gums, deep lilac *Eremophila willsii,* friendly wild donkeys, Ghost Gums and granite tors of the Devil's Marbles, Major Mitchell Pink-crested Cockatoos, Topknot Pigeons and the cemetery of the Elsey station where most of the characters of "We of the Never Never" are buried

At Mataranka we saw the 80°F spring making a pool emptying into the Waterhouse Creek, and the Roper River showed pink-purple water lilies.

Seven inch golden orb spiders, lovely yellow *Hibiscus panduriformis,* pale yellow *Grevillea dimidiata,* the colourful Pinkerton Range, red *Brachychiton paradoxa,* golden yellow *Cochlospermum,* and a remarkable leguminous plant with strange catkins with yellow stamens of male flowers above and white female flowers below—*Dicrostachys spicata*—and the beautiful Victoria River Crossing, gave an idea of the strange and fascinating country. Various types of termite mounds were found in different areas. Near Timber Creek, a species of Terminalia tree with tesselated bark bore quandong like fruits demonstrated by an aborigine as edible. Most Terminalia species have winged fruits.

The diversion dam at Kununurra abounds in bird life and basking crocodiles. The mangroves of Wyndham, a strange woolley sundew near Hall's Creek, 10-15 feet high pink *Calytrix microphylla,* red flowered Bauhinia trees, flat top mountains, Fitzroy Crossing with a concrete causeway, and the beautiful limestone cliffs showing fantastic shapes in Geike Gorge were all shown.

A pied butcher bird and a triumphant shot of Ian Morrison with two big Barramundi livened the scene. Acacias abounded—40 or 50 different species, one with red to chocolate flowers. At Derby the Civic Centre showed a bottle tree. These baobabs are extensively distributed. One showed an opening in the side. This is said to have been a jail. One slide showed a large creamy flower of a baobab tree. At Broome, an old pearling lugger rested high and dry on the mangroves. A foot-print of a dinosaur, 30 yards out from the shore —left 120,000,000 years ago—was shown in the sandstone.

From Broome to Port Hedland, a corrugated 400 mile stretch has no water or provisions. Slides showed blue *Cyanostegia,* purple-pink *Callandrinia,* white *Capparis lasianthos,* cream *Hakea lorea,* and Sturt's Desert Pea with a variety of coloured centres. A thorny dragon—*Moloch horridus*—proved photogenic.

Marble Bar presented a fine figure of an aborigine host-cum-guest at the jail. Beautiful streaky coloured banding showed in the jasper cliffs.

Dale's Gorge scenes revealed 4-500 feet deep brilliant red cliffs and green water below. One river gum showed self grafting in its boughs.

The Robe River had magnificent paper bark trees, *Melaleuca leucodendron.*

As the journey continued from Ashburton River to the Murchison, slides showed ever changing colour and form of flowers: red, round heads of *Gomphrena,* violet *Swainsona occidentalis,* purple-violet *Ruellia primulacea,* pink *Grevillea petrophilioides,* creamy *Anthocercis littorea,* red *Hakea bucculenta,* blue-purple *Stemodia grossa,* pale yellow *Grevillea dimidiata,* a red beady *Darwinia* and *D. neildiana,* lemon *Melaleuca cardiophylla,* blue *Caladenia gemmata,* pinkish-violet *Melaleuca radula, Hakea orthorrhynchus* with birdlike capsules, low 15 inch high *Banksia laricina,* golden *Dryandra,* scarlet *Grevillea dielsiana,* and brilliant red *Verticordia grandis.*

The President thanked Mr. Morrison, and members showed their appreciation of the interesting talk. Mr. Ian Morrison projected the slides. Mr. D. McInnes complimented the editor, Mr. Grif Ward, on the current Naturalist and its contents.

Exhibits

Miss K. Hall showed a drawer, one of a pair belonging to a table in a shed with earthen floor at Balnarring. The owners left towels in one drawer and tissues in the other. A mouse—probably a yellow footed marsupial mouse—*Antichinus flaviceps,* made her nest of leaves and tissues from the next drawer. She had several young.

Mr. T. Sault brought fossil leaves in Oligocene under basalt from Bundarrah River and partly silicified wood—probably Hoop Pine from Bundarrah River (Oligocene).

Mr. A. J. Swaby showed *Fratia surrepens* (alpine Pratia—Lobeliaceae) and *Persoonia pinifolia.*

A huge larva of White-stemmed Gum Moth, *Chelepteryx collesi,* was displayed as well as two longicorn beetles and a robber fly.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Wednesday, 11 March—Annual Meeting at National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—"Conservation 1970"—Speakers: Ros. J. Garnet, Reg Johnson (B.O.C. Pres.), David Lee (F.N.C.V.).
4. New Members.

December '69; January '70

(a) *Ordinary*:
Mr. Ross Burgess, 13 Otterington Grove, East Ivanhoe, 3079. (Interest: Geology.)
Mr. William A. Davis, 39 Fairlie Avenue, Macleod, 3085. (Interest: Ornithology & Nature photography.)
Miss Alison E. Fraser, Flat 11, 11 Raleigh Street, Windsor, 3181. (Interest: Entomology.)
Mr. Robert J. Lawson, 8 Gwenda Avenue, Moorabbin, 3189. (Interest: Conservation of Australian Birds & Animals.)
Dr. Margaret McLeod, Royal Park Receiving Hospital, Private Bag 3, Parkville, 3052. (Interest: All Naturalist Studies.)

Joint Ordinary:
Mrs. R. Kelly & Master Andrew Kelly, 4 Trawalla Avenue, Toorak, 3142.

(b) *Country*:
Mr. John E. Jamison, 37 Dawes Road, Kyabram, Vic., 3620. (Interest: Conservation of flora & fauna.)
Mr. Thomas McK. King, Esmonde Street, Rushworth, Vic., 3612. (Interest: Conservation of flora & fauna.)

(c) *Junior*:
Mr. L. G. Hodgsen, "Cambina", Calder Highway, Keilor, 3036.
Mr. Michael D. Howes, 100 Walpole Street, Kew, 3101. (Interest: Geology.)

5. General Business.
6. Nature Notes and Exhibits.

Monday, 13 April—Speaker: Helen Ashton.

F.N.C.V. EXCURSIONS

Sunday, 15 March—Lal Lal. The coach will leave Batman Avenue at 9.30 a.m. Fare: $2.00. Bring two meals.

Easter: 27-30 March—Warrnambool with trips to Tower Hill, Port Campbell, etc. A coach has been chartered for this period and motel accommodation booked for coach party at $6.50 per day for dinner, bed and breakfast. This is to be paid individually by members and the coach fare of $15.00 should be paid to the excursion secretary when booking, all cheques to be made out to Excursion Trust. The coach will leave Flinders Street outside the Gas and Fuel Corporation at 9.00 a.m., Good Friday.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated.)

Thursday, 12 March—Botany Group. Mr. J. H. Willis will speak on "Botanical Personalities in Australia".

Wednesday, 18 March—Microscopical Group.

Wednesday, 1 April—Geology Group.

Thursday, 2 April—Mammal Survey Group at Sir Arthur Rylah Institute for Environmental Research, corner of Brown St. and Stradbroke Ave., Heidelberg.

Friday, 3 April—Montmorency District Junior F.N.C.

Monday, 6 April—Entomology and Marine Biology Group meeting at 8 p.m. at the National Musuem, Russell Street, Melbourne.

Thursday, 9 April—Botany Group—Myrtaceae, by Miss M. Lester.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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F.N.C.V.

the VICTORIAN NATURALIST

Vol. 87, No. 4 April, 1970

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The Feathertail Glider (*Acrobates pygmaeus*) is the smallest species of Glider; its overall length being about 6 inches (15 cm) of which the tail forms half this total. Because of its size and nocturnal habits, it is rarely seen; but is in fact fairly common over its wide distribution from Cape York to Victoria and S.E. South Australia. *Photo*: W. H. King.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: P. Gahan

F.N.C.V.

Vol. 87, No. 4 8 April, 1970

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Front Cover:

Flocks of Budgerigahs coming to drink at a waterhole beside The Bitumen, north of Alice Springs. Photo: Graham Pizzey.

Two New Whale Records from Victoria

Mesoplodon bowdoini Andrews (Ziphiidae) and *Balaenopteraedeni* Anderson (Balaenopteridae).

by Joan M. Dixon*

Summary

In 1968 two whales belonging to species hitherto unknown from Victorian waters were stranded on the Victorian coast to the south west of Melbourne. These have been identified as the beaked whale *Mesoplodon bowdoini* (Andrews' Beaked Whale) and the baleen whale *Balaenoptera edeni* (Bryde's Whale).

Mesoplodon bowdoini Andrews, 1908, Andrews' Beaked Whale. (Plates 1-4.)

* Curator of Vertebrates, National Museum of Victoria.

This specimen, an adult female, was washed up on the beach near Hordern Vale at the mouth of the Aire River (Lat. 38°47′S, Long. 144°23′E) in May, 1968. Photographs taken by local schoolteacher Mr. K. Taylor, and by Mr. C. Marriner of Hordern Vale were sent to Mr. N. A. Wakefield of Melbourne. He recognised the specimen as a beaked whale and contacted me about this matter. I visited the locality on 13 May, 1968. By this time local residents had buried the whale in the sand, but it was possible

Plate 1

Mesoplodon bowdoini (Andrews' Beaked Whale) female, stranded at Hordern Vale, Victoria, May, 1968. Nat. Mus. Vict. reg. no. C8442.

Photo: K. Taylor.

to uncover, examine and photograph the head. The tongue was badly swollen, which made examination of the jaws difficult, but as far as could be determined at that stage, the specimen was a beaked whale, *Mesoplodon* sp. No teeth could be felt projecting through the gumline of either jaw. In July, 1968, I returned to the area and with the assistance of Mr. Marriner removed the head from the body, and rough-cleaned the skull. It was badly fractured, the rostrum broken off from the main part of the cranium, pterygoids fractured, and mandibles shattered, particularly in the region of the angle. The skull was taken to the museum and preparation completed. The presence of a single pair of mandibular teeth was noted. The position of each tooth, near the posterior union of the symphysis, and the shape of each tooth indicated that the specimen was a female *Mesoplodon bowdoini*.

Plate 2
Mesoplodon bowdoini C8442. Dorsal view of skull.
Photo: F. Guy.

Plate 3
Mesoplodon bowdoini C8442. Ventral view of skull.
Photo: F. Guy.

The rest of the carcase was left to decompose in the sand and the site was revisited in December, 1968. By this time the shifting sand had uncovered some of the caudal vertebrae, and it was possible to recover a large proportion of the skeleton. Skull and skeleton are now housed in the National Museum of Victoria, registered No. C8442.

Measurements in cm.

Body length 394 (taken by Mr. K. Taylor, May, 1968.)

Skull dimensions:

Maximum length	68.5*
Maximum length of rostrum (tip to line connecting antorbital notches)	38.5*
Tip rostrum to anterior margin superior nares	47.0*
Maximum breadth across zygomatic processes of squamosals	34.7
Maximum breadth foramen magnum	10.7
Maximum breadth across exoccipitals	28.6
Width rostrum in apices antorbital notches	20.6
Width rostrum in apices prominential notches	16.2
Maximum transverse width of superior nares	4.8
Least distance between maxillary foramina	7.7
Least distance between premaxillary foramina	3.8
Maximum depth at occipitals	34.0
Maximum depth at pterygoids	27.4*
Width rostrum (middle)	5.7
Depth rostrum (middle)	7.4
Length mandibular symphysis	11.31*

(*indicates that measurement is incomplete due to skull damage).

Tooth measurements (tooth from right mandible)

Height at anterior face	6.1 cm.
Height at posterior face	5.02 cm.
Length of base	4.78 cm.

Remarks: Guiler (1967) has recorded a skull of *M. bowdoini* from Marion Bay, Tasmania. Gaskin (1968) mentions that in the Southern Hemisphere, *Mesoplodon bowdoini* has been recorded from New Zealand as far south as Stewart Island and from Bunbury, Western Australia (Glauert, 1947). The above Hordern Vale specimen appears to constitute the first Victorian record of this species..

Bryde's Whale *Balaenoptera edeni* Anderson 1878. (Plates 5-8.)

On 25 July, 1968, another whale was stranded on the Victorian coast, on this occasion at the mouth of Limeburner Creek, Corio Bay, (Lat. 38° 04"S, Long. 144° 24'E).

It was examined by Mr. R. Bickerdike of the Geelong Church of England Grammar School, who took photographs, made observations and measurements. The following information was supplied by Mr. Bickerdike.

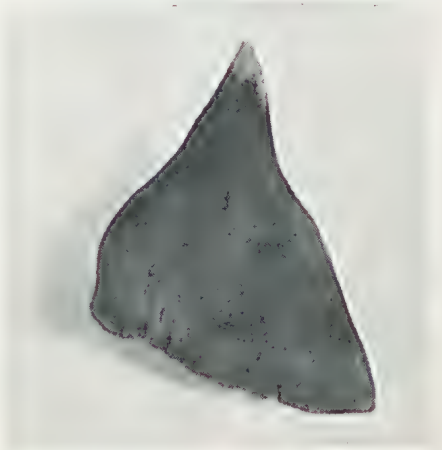

Plate 4
Mesoplodon bowdoini: C8442. Lateral aspect of tooth from right mandible.
Photo: F. Guy.

Plate 5
Balaenoptera edeni (Bryde's Whale) young male, stranded at Corio Bay, Victoria, July 1968. Nat. Mus. Vic. reg. no. C8441.

Photo: R. Bickerdike.

"Tip of snout to centre of flukes	21′	
Tip of snout to dorsal fin	13′	8″
Tip of snout to flippers	6′	
Length of flipper	2′	
Width across flukes	4′	10″
Approximate girth (by flippers)	9′	6″

Dorsal side was a blue-grey while the non-pigmented area on the ventral side extended through to the tail. There was no ridging on the back. Flippers were blue-grey above and grey-white below. Ventral grooves extended as far as the navel. I could not detect any slit in the hinder margin of the dorsal fin."

From the photos taken by Mr. Bickerdike and officers of the Fisheries and Wildlife Department, the three longitudinal ridges on the snout indicated that this was a Bryde's Whale *Balaenoptera edeni*. The specimen was a young male.

The skull and the baleen plates were obtained for the museum collections, registered No. C8441. The baleen plates numbered approximately 260 on each side. They were grey-black in colour with yellowish-white bristles, the longer ones being fairly stiff, thick and uncurled. The largest plate was 12.5 cm. long excluding bristles, and 10 cm. wide at the base. Bristles on the baleen were somewhat finer than those on specimens recorded from Western Australia by Chittleborough (1959). However, Chittleborough and Dawbin (pers. comm. 1968) concurred in the opinion that the specimen was a Bryde's Whale and attributed the fineness of the baleen to the fact that the specimen was a juvenile.

Plate 6
Balaenoptera edeni C8441. Dorsal view of head showing the three diagnostic longitudinal ridges.

Photo: R. Bickerdike

Skull measurements in cm.

Length of skull from posterior margin of condyles to tips premaxillae	139
Greatest breadth of skull	61
Breadth of rostrum basally	36
Anterior margin of nasals to tips of premaxillae	83.5
Length of premaxillae	92
Length of nasals mesially—	
right side	10
left side	10.5
Length of nasals laterally—	
right side	13
left side	13
Breadth of nasals, anteriorly—	
right side	4.5
left side	4
Maximum height of skull	32
Length of mandible	124
Depth of mandible	19

Remarks: This is the only known record of *Balaenoptera edeni* from eastern Australia. The species has been recorded from Shark Bay, Western Australia, by Chittleborough (1959). Gaskin (1968) mentions several New Zealand records, none of these occurring further south than East Cape, Lat. 37°30′S. Long. 178° 30′E.

Plate 7
Balaenoptera edeni C8441, entire baleen of one side. *Photo*: F. Guy.

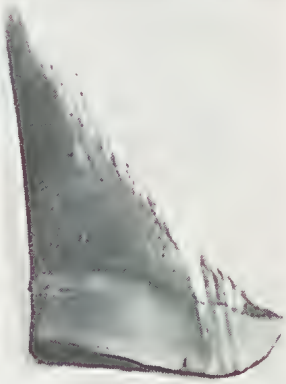

Plate 8
Balaenoptera edeni C8441. Single baleen plate. *Photo*: F. Guy.

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The author wishes to acknowledge the contributions of the following persons to the preparation of this paper: Mr. and Mrs. C. Marriner of Hordern Vale, Victoria; Mr. K. Taylor; Mr. A. J. Coventry, Nat. Mus. Vict.; Mr. N. A. Wakefield of Monash Teachers' College; Mr. R. M. Warneke of the Fisheries and Wildlife Department, Melbourne; Mr. C. McCann, Wellington, New Zealand; Mr. R. Bickerdike, Geelong Church of England Grammar School; Dr. W. Dawbin, University of Sydney; Dr. G. Chittleborough of the CSIRO Division of Fisheries and Oceanography.

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Geology Group Excursions

Sunday, 5 April—To Waurn Ponds and other localities in the Geelong area. Leader—Mr. Stan Rowe.

Sunday, 10 May—To Airey's Inlet. Leader—Mr. George Carlos.

Sunday, 7 June—To Maribyrnong River Terraces. Leader—Mr. Dan McInnes.

Transport is by private car (spare seats available). Excursions leave from the western end of Flinders Street Station, opposite the C.T.A. Building, at 9.30 a.m.

Silica Minerals

BY M. J. MOONEY

Anyone interested in minerals need never be concerned by the saying "Small things amuse small minds", for minerals are the building blocks of this our Earth.

Geologists who have studied the Earth know that the outer skin at least, consists largely of silicon and oxygen. These elements are combined in many ways, but one of the most important is as silicon dioxide *silica;* this occurs in many forms, some of which are very beautiful as well as being of great use to man. (See Fig. 4).

Silica is a very stable chemical compound which can exist over a very wide range of temperatures and pressures. However, the silicon and oxygen atoms may combine in different ways, each silica mineral representing one particular *phase* or arrangement of atoms.

Sometimes the temperature and pressure of a mass of silica may change very rapidly; so rapidly in fact that the molecules do not have time to become rearranged in the pattern that is most stable under the new conditions. In such cases the original mineral is present outside its normal range of temperatures and pressures—it is present as a *metastable* phase. A metastable phase will eventually alter to a more stable form but the time required may vary from a few minutes to many hundreds of years. Ordinary glass is a metastable material and, over a period of many years, will tend to crystallise or devitrify.

At ordinary temperatures and pressures, *low-quartz** is the stable form of silica. As the temperature rises above 573°C. (degrees Centigrade), the molecules become slightly rearranged with respect to each other, forming *high-quartz.* At 870°C., a further change occurs, and *tridymite* becomes the most stable form of silica. At 1470°C., the silica molecules become rearranged once more, forming *high-cristobalite,* which is the stable phase up to the melting point.

In molten silica, the silica molecules are randomly arranged; if the molten silica be cooled very quickly, there may not be sufficient time for the molecules to become part of a regular pattern by the time solidification is complete. Solidified silica in which the molecules are randomly arranged is known as *silica-glass* or *lechatelierite.*

Low-quartz is the stable phase at low temperatures, even under the highest pressures. However, between 380°C. and 585°C., at pressures greater than three hundred and forty atmospheres*, *keatite* is the most stable form of silica. At still higher temperatures, and pressures greater than twenty thousand atmospheres, *coesite* is the most stable phase. With temperatures of between 1200° and 1400°C., and pressures of more than one hundred thousand atmospheres, *stishovite* is the most stable phase.

* The word "quartz" when used alone always refers to low-quartz.

† One atmosphere is approximately equal to a pressure of 14.66 pounds per square inch.

The various silica phases are quite distinct and the transformation (change) of one phase to another i.e., the rearrangement of the silica molecules, can occur only when certain critical temperatures and pressures have been reached.

All the silica minerals (with the exception of the non-crystalline *lechatelierite* and *opaline silica*) are composed of tetrahedral (pyramid shaped) molecules in which each silicon atom is surrounded by four oxygen atoms. The way in which these molecules are combined varies with the different silica minerals.

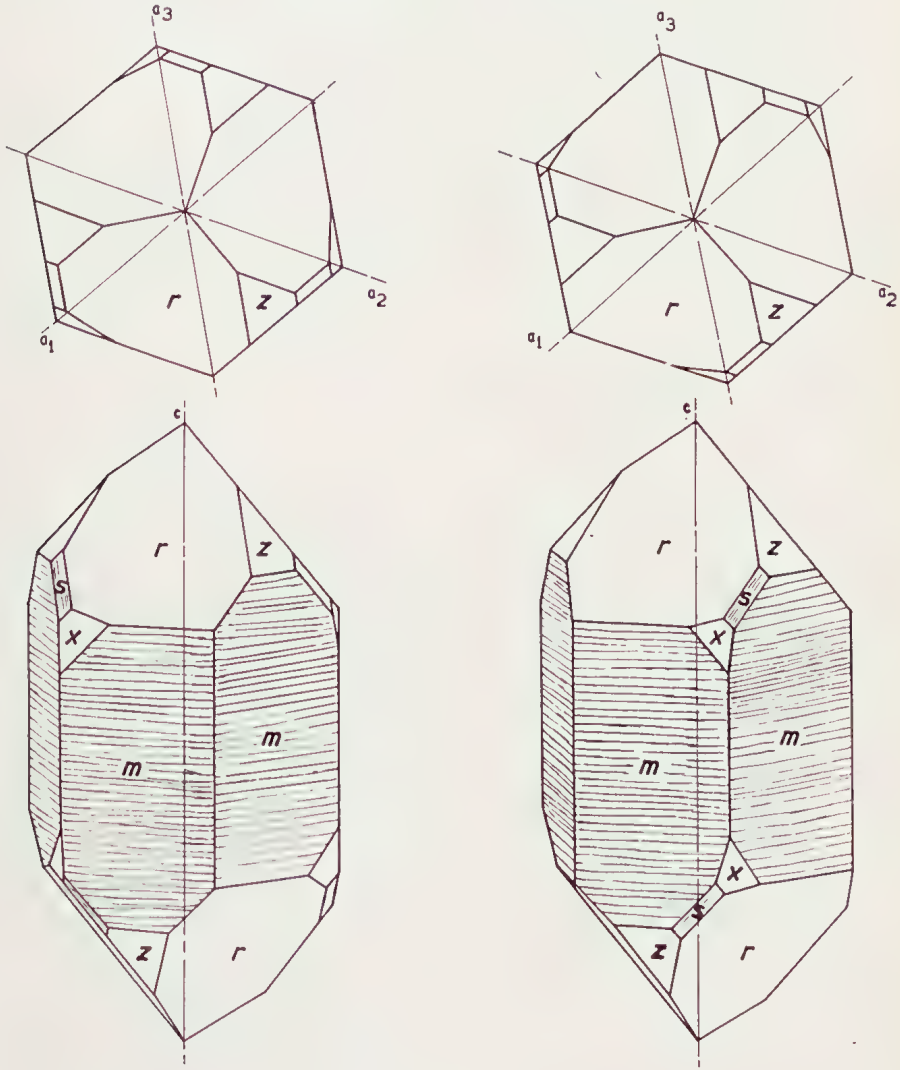

Figure 1.

The best known form of silica is quartz. Even though quartz constitutes about twelve per cent of the Earth's crust, it is generally found as small grains in igneous, sedimentary or metamorphic rocks. Large masses of quartz are unusual, the largest crystal ever found (at Manchao Felipe in Brazil) being twenty feet long and weighing forty-four tons.

In quartz, the silicon and oxygen atoms form a tetrahedron in which each silicon atom is surrounded by four oxygen atoms. If we take a "tetrapak" of milk we may imagine the oxygen atoms to lie at the corners while the silicon atom lies inside the tetrapack. Each "tetrapak" is joined to its neighbors so as to form a spiral, the entire structure looking rather like a corkscrew or a spiral staircase.

Crystal Form:

Most quartz crystals consist of six prism faces, with three positive rhombohedron and three negative rhombohedron faces at each end of the crystal —a total of eighteen faces. The faces of the positive rhombohedron generally are larger and brighter than those of the negative rhombohedron. In addition, trigonal pyramid and positive trigonal trapezohedron faces are commonly present. These two forms slope upwards to the right on right-handed crystals and upwards to the left on left-handed crystals (fig. 1). Frondel (1) has listed four hundred and sixty-three crystal forms believed to occur on quartz crystals but most of these are very rare and extremely small.

As well as occurring in its own characteristic habits (shapes), quartz can replace many other objects, assuming their external form. About fifty different minerals (including calcite, gypsum and most of the rock-forming minerals) are sometimes replaced by quartz. Wood, shells and bones are frequently replaced by fine-grained quartz and are then said to be *silicified*. Objects so replaced are said to be *pseudomorphed* by silica provided that the original form of the object has not been destroyed.

Twinning:

Nearly all quartz is twinned i.e., certain parts of a crystal are rotated relative to the remainder of the crystal. There are four main types of twinned crystals; Brazil twins, Dauphine twins, Combined Law twins and Japanese twins. The study of twinning is very difficult and requires a detailed knowledge of crystallography. The quartz plates used in wireless transmitters and other electronic equipment must be made from untwinned quartz.

Inclusions:

Quartz crystals frequently contain inclusions of liquids, gases and minerals; usually the inclusions are too small to be seen with the naked eye but sometimes the irregularly shaped cavities are fairly large (up to 2¼" x ¼"). Most inclusions consist of both a liquid and a gas. The contained fluid varies from nearly pure water to salt solutions of sodium, potassium and calcium chlorides and sulphates.

At room temperatures, liquid inclusions always contain some gas. One method of estimating the temperature of formation of the quartz involves determining the temperature at which the liquid just fills the cavity.

At least fifty-seven different minerals occur as inclusions in quartz. Of the minerals found as inclusions, *rutile, chlorite, tourmaline, clay minerals* and *iron oxides* are the most common. Rutile, of a reddish-yellow to yellow

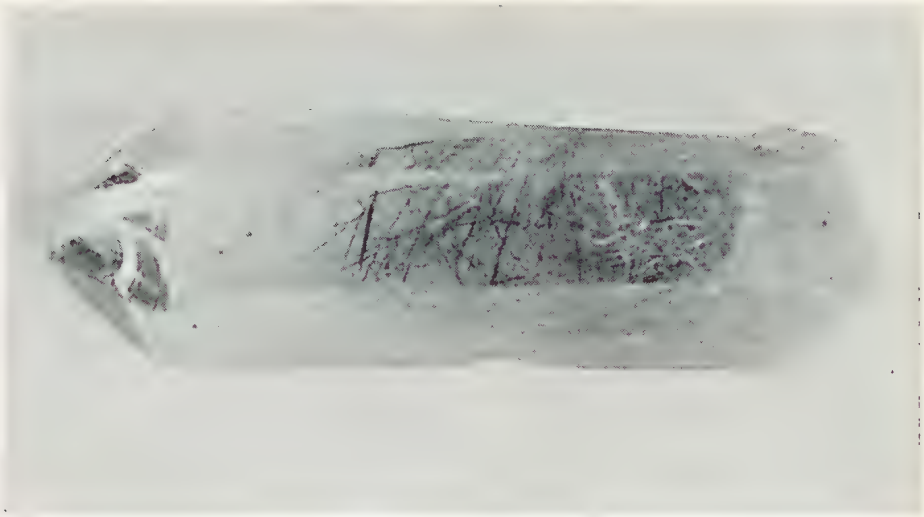

Figure 2.
Needle-like inclusions of amphibole in a quartz crystal from California, U.S.A.
Photo: F. Bates

colour usually occurs as groups of divergent, needle-like crystals which may be as much as ten inches in length. Twinned, net-like (reticulated) aggregates of rutile in quartz are known as **sagenite**. Most rutilated quartz is either clear or smoky; amethyst may contain rutile inclusions, but, more commonly the inclusions in amethyst are of *goethite* (a hydrous iron oxide).

Tourmaline is often found as needle-like inclusions in quartz; if the inclusions are very small and numerous the quartz may appear to be black in colour.

In many Victorian gold-mining districts, green, opaque, moss-like inclusions, apparently of the mineral chlorite, are present within many of the quartz crystals.

Aventurine Quartz contains small flakes of *mica*. It may be white, silvery, reddish-brown or green in colour. Artificial aventurine is manufactured by dispersing flakes of copper in soft glass; it is known as "**goldstone**" and may be distinguished from the natural material by its softness (a file will scratch "goldstone" but not natural aventurine).

Iron oxide particles frequently occur as inclusions in quartz crystals. Sometimes the iron oxide is more abundant on one side of the crystal than on the other; quartz crystals from Corunna Station, South Australia, are of this type.

Some quartz crystals have a transparent outer shell enclosing earlier formed crystals which are often outlined by zones of inclusions. If the outer shell is sufficiently transparent that the earlier formed crystals are visible then the quartz is said to contain "*phantoms*".

Varieties of Coarsely Crystalline Quartz:

Amethyst is a violet, bluish-violet or reddish-violet variety of quartz. The crystals usually are relatively small (up to five inches in length) and consist of positive rhombohedra; negative rhombohedra and prism faces may also

be present. The colour is caused by the presence of iron oxide (0.01% to 0.35% Fe_2O_3), the depth of colour varying with the iron content. When heated, amethyst loses its colour, the ature reached during the heating cycle. final shade depending on the temper-

Most amethyst occurs in cavities in rocks such as basalt; it occurs also in veins in granite and in some ore deposits. In Victoria, amethyst occurs near Beechworth as crystals and small pebbles.

Citrine is a transparent, yellow to yellowish-brown variety of quartz containing small amounts (less than 0.03% Fe_2O_3) of hydrous iron oxide. Citrine is much rarer than either amethyst or smoky quartz; as a result, most "citrine" gemstones consist of amethyst or smoky quartz that has been heated to 500-600°C.

Natural citrine usually is found associated with amethyst; the best known localities are in Brazil and Scotland.

Smoky quartz is very common; it may be nearly colourless (much so-called "colourless quartz" is slightly smoky), any shade of brown or even nearly black. Few specimens are evenly coloured throughout. Chemically, smoky quartz is similar to clear quartz. Frondel (1) states that much of the smoky quartz from the Swiss Alps contains about half the amount of impurities present in clear, colourless quartz from the same locality. It is thought that the smoky colour is due to the replacement of silicon atoms by aluminium atoms. This leads to an electrical imbalance which is the cause of the smoky colour.

Smoky quartz typically forms at relatively high temperatures, occurring in many granites and granite pegmatites, occasionally as crystals weighing more than a thousand pounds. In Victoria, pebbles of smoky quartz are common in the Beechworth district. Smoky quartz occurs also as large grains in granite at Powelltown and Mount Buffalo.

Rose quartz is transparent to translucent, the colour varying from a pale rose-pink to fairly deep rose-red. Generally it occurs as flawed masses, but crystals have been found (in Brazil). Both crystals and the massive material occur in the central zones of some granite pegmatites. Occasionally, rutile inclusions cause *asterism*, the material appearing to contain a six-rayed "star". Manganese, and possibly titanium, are thought to cause the pink colour of rose quartz. Frequently opaque, pink vein quartz is found, the colour being caused by inclusions of clay minerals and finely divided iron oxides.

Blue quartz varies from pale, soft blue, to lavender in colour as a result of the scattering of light by millions of minute rutile crystals (as many as thirty-three million in one cubic inch of blue quartz). Blue quartz is common as a waste material in the mines at Broken Hill in New South Wales. It is formed in certain igneous and metamorphic rocks.

Milky (Reef or Vein) **quartz** is white in colour because light is scattered by flaws and cracks inside the material. In some cases, clay minerals enclosed within the quartz may cause it to have a porcellaneous appearance.

Rock crystal is the name given to clear, colourless quartz crystals. Despite its pure appearance small amounts of such elements as aluminium, sodium and titanium are often present. Small,

Figure 3.

Quartz Crystal (variety Rock Crystal) in a matrix of milky quartz, from Lyndhurst, South Australia.

Photo: F. Bates

doubly terminated crystals are sometimes called "diamonds" e.g., "Herkimer Diamonds" from Herkimer Country, New York, U.S.A.

Probably the largest known crystal of clear quartz was one weighing five and a half tons, found in Brazil. In Victoria, rock crystal has been found at Tallangatta and near Tallandoon, as well as at Woods Point and Gaffney's Creek. Large crystals of clear quartz have been mined from many localities in the New England district of New South Wales, especially near Hillgrove.

Varieties of Fine-Grained Quartz:

The fine-grained varieties of quartz are very common and some of them are often used as gemstones.

Chalcedony is a translucent, fibrous form of quartz, occuring as veins and cavities in other rocks, or as grape-like masses of a grey or pastel colour. Except for the sub-variety *agate* which has bands of different colours, chalcedony usually is uniformly coloured in any one specimen. In chalcedony the fibres lie at right angles to the surface; usually they can be seen only with the aid of a microscope and may form either parallel or fan-like aggregates.

There are many sub-varieties of chalcedony including:

Iris agate (Rainbow Agate) — white light falling on this type of chalcedony is split up into its component colours as a result of diffraction caused by the fibres.

Sard—a pale to dark-brown chalcedony which grades into:

Carnelian—a translucent, reddish-brown to deep blood-red chalcedony, the colour of which is caused by the presence of finely divided iron oxides.

Moss agate—a translucent chalcedony containing black, dendritic (fern-like) inclusions of either iron or manganese oxides. The dendrites form by the segregation of the iron and manganese when gelatinous silica loses water as it transforms into chalcedony.

Moss opal—is a similar material except that the silica is in the form of common opal. Very beautiful specimens of moss opal occur near Norseman in Western Australia.

Agate—a sub-variety of chalcedony characterised by well developed, continuous bands of uniform thickness.

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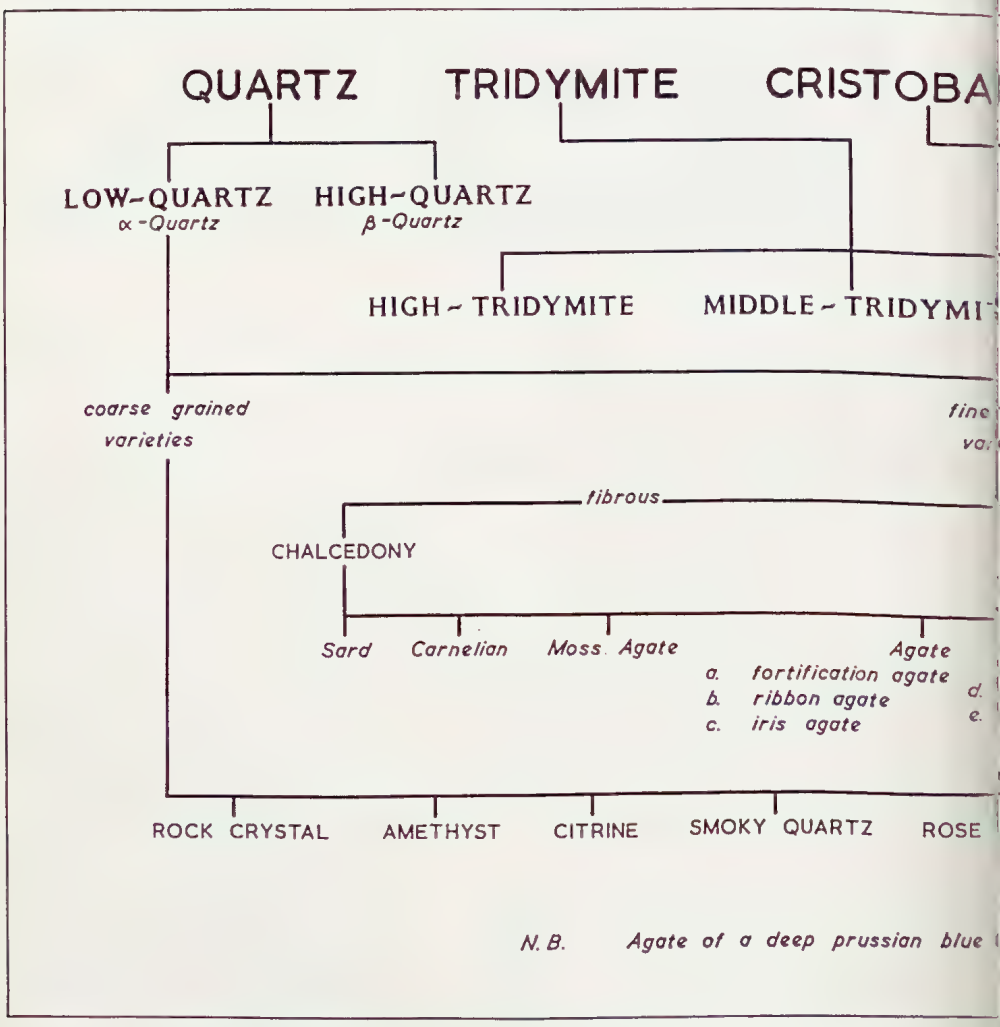

Agate is much used for jewellery, and hundreds of names have been given to the different combinations of colour pattern and banding.

Three major types of banding are recognized;

a. Fortification Agate—the bands form sharp, re-entrant angles.

b. Eye Agate—when sectioned, the bands are in the form of a series of concentric circles.

c. Ribbon Agate—the bands are straight and parallel.

Agate frequently occurs as "nodules" (irregular masses having an unattractive outer surface) in igneous flow rocks such as basalt. Generally, the nodules occupy cavities formed by the accumulation of gases as the lava forming the enclosing rock became solid. Usually, agate nodules are less than one foot is diameter but some-

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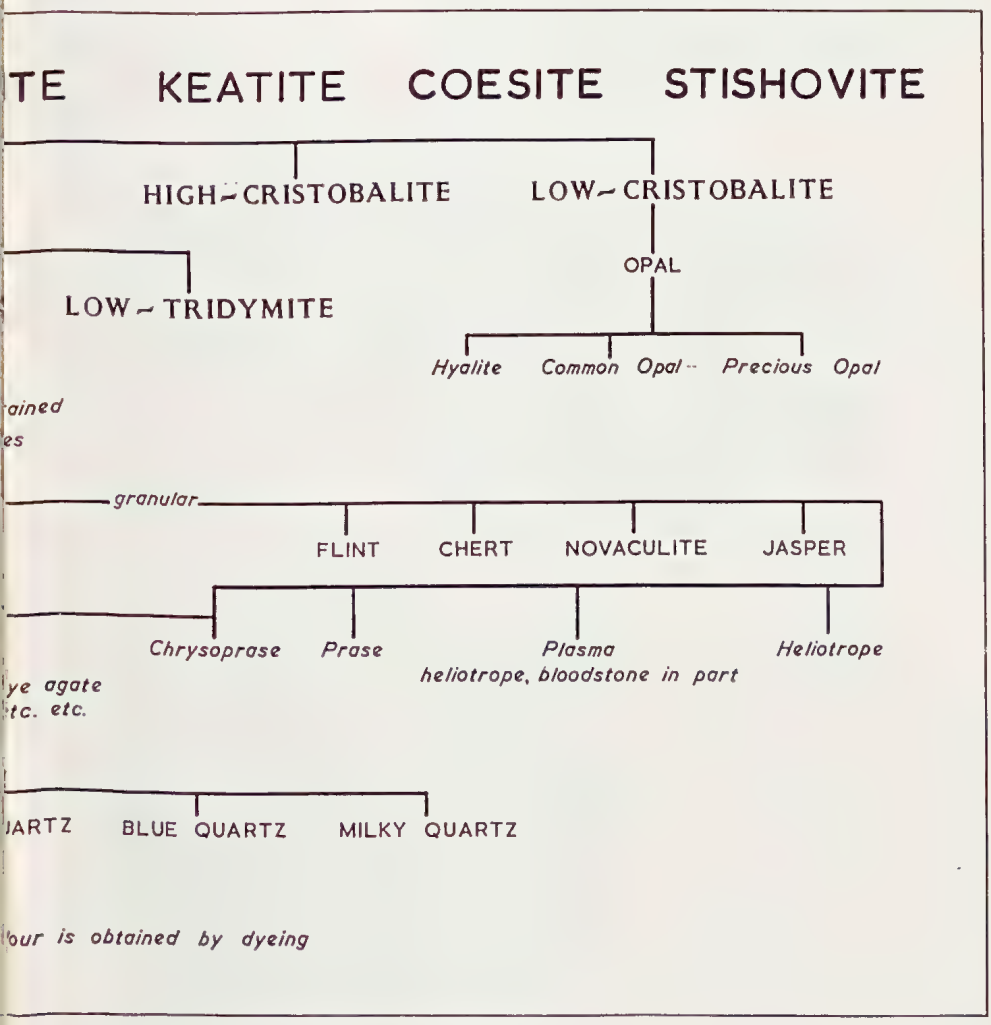

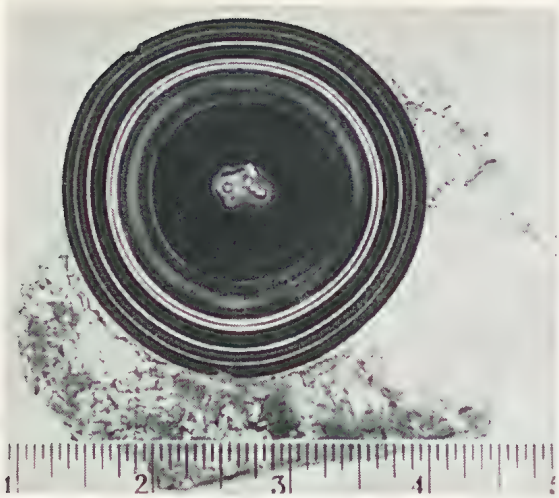

<— 5a.

5b
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Figure 5.

Sectioned and polished agate nodules.

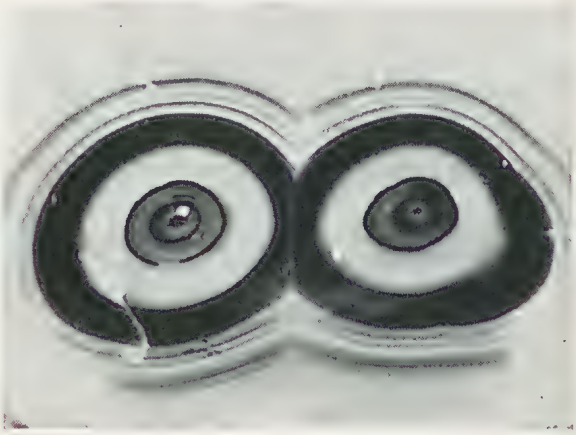
5a. Eye agate from Brazil, South America.

5b. Fortification and Ribbon agate, from erica. Agate Creek, Queensland.

5c. Eye agate from Brazil, South Am-

Photos: Jeffrey Jamieson, National Museum of Victoria.

5c. —>



times may be much larger. Commonly, the nodules have a central cavity filled with quartz crystals; such nodules are called *geodes*.

The best agate in Australia comes from Agate Creek in Queensland; small, beautifully coloured agate nodules have been found near Port Augusta in South Australia. Greyish-white agate pebbles occur in the Beechworth and Nowa Nowa districts in Victoria.

Chrysoprase—a translucent, apple-green, fibrous or granular variety of quartz containing small amounts of nickel silicate. It generally forms veins and cappings associated with weathered silica-poor igneous rocks. Chrysoprase occurs near Marlborough, Queensland*, near Kalgoorlie and at Wingellina in Western Australia.

Prase—a leek-green, translucent, granular variety of quartz, the colour being caused by the presence of inclusions of either *chlorite* or *amphibole* minerals.

Heliotrope and **Bloodstone** are opaque to somewhat translucent, granular varieties of quartz, of a green to greyish-green colour and containing small areas of red or yellow-brown jasper. Bloodstone occurs near Spargoville in Western Australia.

Flint and **Chert** differ from the other fine-grained forms of quartz in that they may be regarded both as sedimentary rocks and also as minerals. Both are granular, the grains being somewhat larger in chert. Fossils may be present and usually are silicified.

Geologists are still undecided about the way in which chert beds are formed. In some cases, the silica has been dissolved during rock weathering and carried down to the sea (by rivers) where it is deposited on the sea floor, eventually forming chert beds. In other cases the chert beds appear to consist of silica released by volcanic activity and by the weathering of volcanic ash. This silica may either be deposited on the sea floor or may replace other rocks such as limestone.

Flint occurs as irregular nodules less than one foot in diameter and chalky-white in colour. Freshly broken (fracture) surfaces are smooth and curved (conchoidal), generally being dark grey or black in colour. The white outer coating consists either of silica or of calcium carbonate.

Chert is a form of quartz having somewhat curved and uneven fracture surfaces. Typically the colour is grey to whitish, yellowish or reddish. As the fracture surfaces become smoother, chert grades into flint.

Flint occurs as nodules in limestone (the flint nodules on Victorian beaches have weathered out of the Tertiary limestones near Portland in western Victoria) while chert generally forms large sheetlike, often bedded masses. Chert is found at Heathcote, Victoria and at Kiandra in southern New South Wales. It is common also in many parts of Queensland, the Northern Territory and Western Australia.

Novaculite—a white-coloured rock found in Arkansas, U.S.A., and composed of interlocking quartz grains. It is thought to be a chert that has been altered (metamorphosed) by heat and pressure.

Jasper is an opaque, fine-grained form of quartz containing up to twenty per cent of iron oxide. Generally it is red or yellow (due to the presence of finely divided hematite or limonite respectively), green or even black.

* "Australian Jade" is a name sometimes given to the chrysoprase from Marlborough. The name is undesirable since *jade* is an entirely different mineral.

Jasper is very closely related to chert but is distinguished by its even fracture and ability to take a high polish.

Jasper may occur in either sedimentary or metamorphic rocks; waterworn jasper pebbles are common in many Victorian rivers e.g., the Avon and the Stratford. Sedimentary rocks composed largely of jasper are common in parts of Western Australia.

Fine-grained forms of quartz very frequently are formed by deposition from cold solutions containing small amounts of dissolved silica. Siliceous pseudomorphs are formed when silica-bearing solutions slowly dissolve the objects and at the same time replace the dissolved material with silica.

The coarse-grained forms of silica usually form from hot solutions associated with igneous rocks but some, notably vein quartz, may also be deposited by cool solutions or may represent resrystallized fine-grained silica.

High Quartz

High-quartz occurs in igneous rocks that have solidified at temperatures above 573°C. e.g., *rhyolite* and *dacite*. Very often it has altered to low-quartz and is then generally opaque and of a white or greyish colour. High and low-quartz crystals are very similar in appearance; however, high-quartz crystals are terminated by hexagonal pyramids and not by positive and negative rhombohedra. High-quartz may be either right or left handed, is usually twinned and breaks relatively easily in two directions.

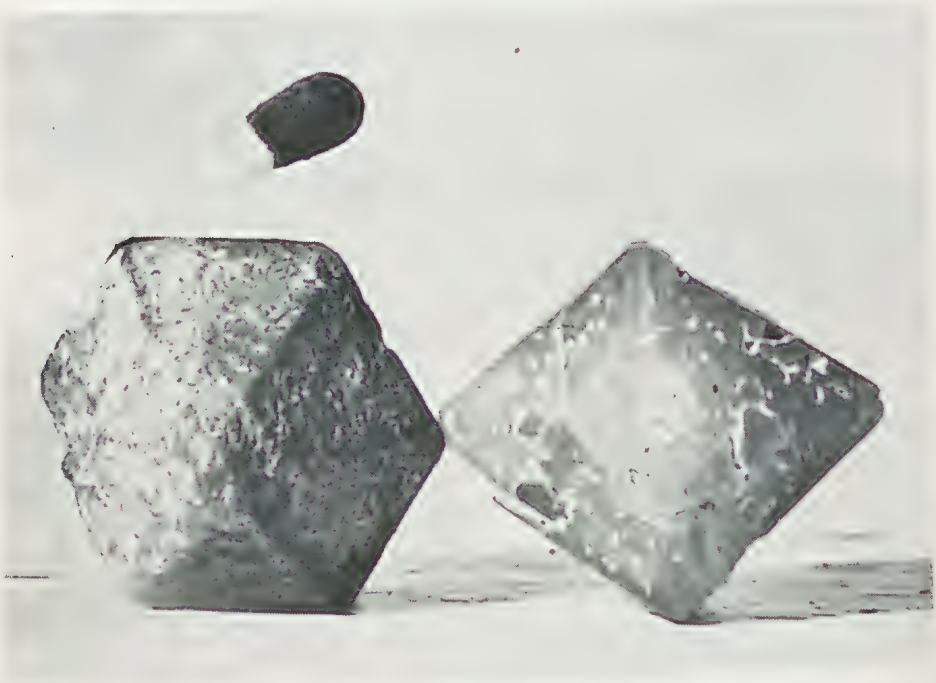


Figure 6.
High (B)-Quartz crystals from Bougainville Island, T.P.N.G.

Photo: B. Smale

High-tridymite is fairly common in silica-rich igneous rocks such as *rhyolite* and *dacite* where it occurs either as grains or small crystals a fraction of an inch in length, lining gas cavities. The crystals occur as flattened hexagonal prisms and pyramids, which, when twinned form rosettes called *trillings*; they are often opaque and of a light grey-brown colour.

High-tridymite forms only above 870°C. and alters (very slowly) to ?hexagonal middle-tridymite when cooled below 163°C. On further cooling to below 117°C., the middle-tridymite alters to orthorhombic low-tridymite. Consequently, all natural tridymite crystals consist of low-tridymite having the same shape as the original high-tridymite.

Low-tridymite is transparent and has a glassy lustre. All low-tridymite has formed by the slow cooling of high-tridymite.

HIGH CRISTOBALITE

High-cristobalite forms at very high temperatures (above 1470°C.) and on cooling, alters at 280°C. to low-cristobalite. High-cristobalite crystallises in the cubic system and whilst generally massive sometimes occurs as small, eight-sided (octahedral) crystals. Like tridymite it is about 2.2 times as dense as water (low-quartz is 2.67 times as dense as water). High-cristobalite occurs in silica-rich volcanic rocks that, geologically speaking, are relatively young.

Thunder Eggs are hollow, roughly spherical structures which have formed in silica-rich volcanic rocks such as rhyolites. They consist of radially arranged feldspar crystals surrounding steam cavities in the lava, the spaces between the crystals being occupied by high-cristobalite. This high-cristobalite subsequently transformed to the low temperature form as the enclosing rock became cooler. The hollow interior either is partly or completely infilled agate, chalcedony and quartz. Occasionally, minerals such as calcite and hematite are also present.

LOW CRISTOBALITE

Low-cristobalite is tetragonal but almost always occurs as fibrous crusts and veins. It is the form of silica which is deposited by cool or warm water at ordinary pressures.

Opal is an amorphous or poorly crystalline variety of low-cristobalite containing up to twenty per cent by weight of water. The colour of opal varies greatly and may be caused by

1. the presence of impurities such as iron oxide.
2. scattering of light rays by small cracks within the opal.
3. *diffraction* of light rays by regular arrays of silica spheres. The study of the conditions necessary for diffraction to occur, requires a knowledge of advanced physics. A further difficulty is that the surfaces of both natural and cut opals normally are curved, not flat.

This last mechanism is responsible for the "play" of colours in precious opal; regular arrays of uniformly sized silica spheres cause white light to be *diffracted* or split up into its component colours.

For diffraction of visible light to occur, these spheres must be between 1700 and 3500Å* in diameter. The colour of an opal is proportional to the size of the spheres and is blue-violet when the spheres are approximately

* A = Angstrom unit, a unit of length which equals one hundred-millionth of a centimetre i.e., there are approximately two hundred and fifty-four million angstrom units in one inch.

Figure 7.

Electron micrograph of Precious Opal section of fossil bone showing the regular shape and orderly array of the silica spheres. The spheres conist of seconday silica aggregates having a central core.

Photo: Dr. J. V. Sanders, Division of Tribophysics, CSIRO. Magnification 25,000X

1750Å in diameter. Opal having both blue and green "fire" consists of spheres about 2000Å in diameter; spheres about 3500Å in diameter produce the full play of colours, including red.

Work carried out by the C.S.I.R.O. has indicated the conditions under which precious opal may be formed. In the arid parts of central Australia, precious opal occurs in seams and cavities in flat-lying sedimentary rocks.

Cavities in these rocks are filled with groundwater containing small amounts of dissolved silica, any water lost by evaporation being replaced by additional groundwater. As the amount of silica in the cavity increases, the water-rich silica molecules coalesce, forming small spheres. These spheres gradually sink to the bottom of the cavity where they cluster together as aggregates. If the jelly-like fluid at the bottom of the cavity is too viscous, either the aggregates will not be spherical or else they will not form regular arrays. In such a case precious opal will not form.

Initially the spherical silica aggregates are very soft and fragile. As the cavity dries out (largely as a result of the sealing of the lower portions of the walls of the cavity by the jelly-like fluid), the aggregates lose water and become relatively hard. From time to time, more water may enter the cavity and, as it evaporates, the additional silica cements the aggregates together. During the drying process the aggregates may either be squeezed out of shape or the space between them may become completely filled with silica. In such a case, the play of colours would be less brilliant or may even completely disappear. When many of the spaces are irregular in form due to their being partly infilled by silica, the opal will have a milky appearance.

A layer of opal one centimeter (about 4/10″) thick may require from two hundred thousand to five million years for its formation.

To summarise, the size of the silica aggregates determines the colours shown by a piece of opal and the form of the spaces between the aggregates controls the brilliance of these colours.

Common opal is formed under conditions that do not permit the accum-

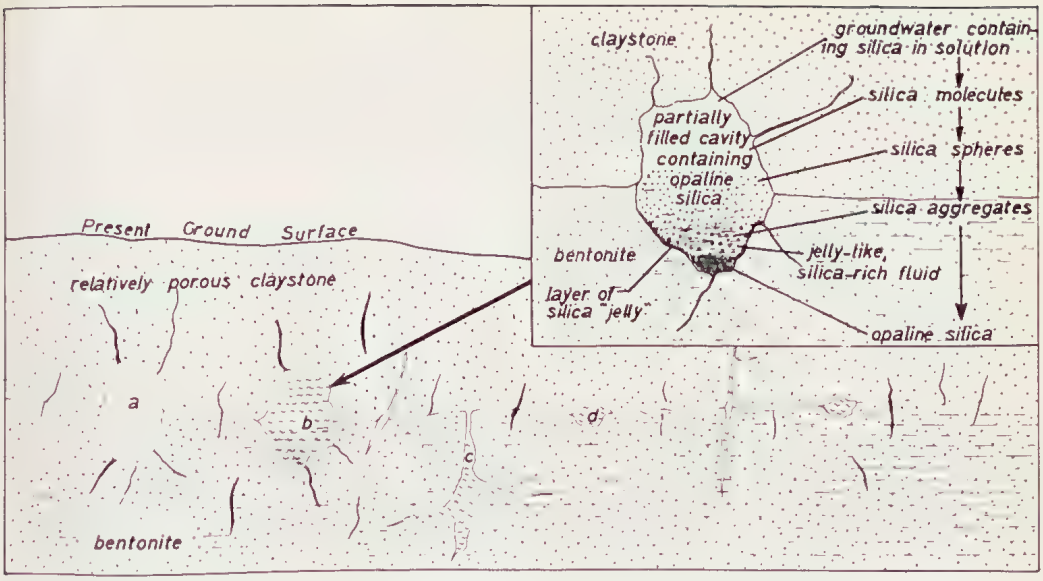


Figure 8: *Diagram illustrating the formation of Precious Opal. (a) empty cavity, (b) partly filled cavity at the junction of a bentonite and an overlying claystone bed, (c) solution cavity, (d) opal replacement of fossil, (e) joint cavity INSET. Detailed view of a typical cavity showing water entering and leaving through fractures in the rock*

ulation of regular arrays of spherical aggregates of a diameter sufficiently large to cause diffraction of visible light.

There are a number of sub-varieties of opal including;

Opalised Wood: Wood which has been replaced by opaline silica; the woody structure usually is clearly visible.

Opalised Bones and *Opalised Shells* are replacements of bones and shells respectively.

Moss Opal: Common opal containing inclusions of manganese or iron oxides. The inclusions often have a moss-like appearance.

Hyalite: A colourless, glassy form of common opal, usually occurring as globular masses or crusts.

Opal is a very common material; it occurs as cavity and fracture fillings in igneous and sedimentary rocks and also as a porous crusts or "*sinter*" near many hot springs. It forms the skeletons of many marine animals and plants and is the main constituent of the rocks known as *radiolarite* and *diatomite*. Wood, bones and shells are frequently found to have been replaced by either precious or common opal.

The world's main source of precious opal is the dry inland parts of Eastern Australia at such places as Lightning Ridge, Andamooka and Coober Pedy. Common opal is found in many places throughout Australia and fine specimens are common in the volcanic rocks north of Buchan, Victoria.

Keatite

Keatite is a tetragonal form of silica not known to occur naturally.

Coesite

Coesite is a monoclinic form of silica formed by sudden, intense (shock) pressures. It is found at Meteor Crater, Arizona, U.S.A.

Stishovite

Stishovite is a tetragonal form of silica, 4.3 times as heavy as water, which is formed at very high temperatures and pressures. It is found as microscopic grains at Meteor Crater, Arizona.

Lechatelierite

If molten silica is cooled very quickly there may not be time for it to become crystalline and silica glass or lechatelierite, will be formed. Generally it is formed when quartz grains are melted by either a meteorite impact or a lightning strike. Lightning strikes frequently form long, thin, tapering tubes having smooth inner walls; the outside is coated with adhering sand grains. Affulgurite from Goroke, in Western Victoria is more than five feet in length. Lechatelierite may also be formed when plant material such as haystacks are burnt.

Acknowledgements

The author is grateful to Dr. A. W. Beasley of the National Museum of Victoria, and to Mr. J. E. Johnson for advice and assistance in the preparation of the manuscript. Thanks are due to Mr. J. K. Jamieson for providing photographs of sawn agate nodules, and to the Director of the National Museum of Victoria for permission to publish these photographs. The Division of Applied Mineralogy, CSIRO, kindly provided information and the electron micrograph of precious opal.

Further Reading

Many books and scientific papers have been written about the various silica minerals; most of these are available at the State Library in Swanston Street, Melbourne.

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CORRECTION AND APOLOGY

In the *Vict. Nat.* **87,** (3) p. 79 for last month, it was wrongly reported that the Conservation Council of Victoria had called a meeting to consider the turning of Gemmills Swamp into an aquatic sports arena. In fact, it was the Shire of Rodney who called the meeting; and our apologies go to the CCV. [Ed.]

book reviews

The Last of Lands

Edited by L. J. Webb, D. Whitelock and J. Le Gay Brereton.
Jacaranda Press Pty. Ltd., 1969

204 + xvi pp., illustrated by 22 coloured, 82 black and white photographs. 10½" x 8". Price $6.95.

This book arose out of a summer school on national parks and conservation held at the University of New England, Armidale, in 1964, and embodies contributions by an impressive group of collaborating authors covering all aspects of the vital subject of conservation in Australia. The introduction rightly claims that conservation ranks with nuclear war and multi-racial strife as the central challenge of our time. Outdated should be "the short-sighted greed (usually euphemized as 'development')" and the old maxim: "If it moves, shoot it; if it stands still, cut it down".

There is a foreword by H.R.H. Prince Philip, Duke of Edinburgh, and the book is dedicated to the late Professor Jock Marshall, whose book, *The Great Extermination,* made as great an impact on the Australian scene as the late Rachel Carson's *Silent Spring* caused around the world.

Part I deals with conservation in general, the ecological aspects being dealt with by Dr. M. F. Day, of CSIRO, Canberra, former chairman of the Australian Academy of Science's Committee on National Parks and Reserves; conservation in relation to the land and its use by R. G. Downes, chairman of the Soil Conservation Authority of Victoria, and member of the National Parks Authority; the economic bases for decision-making on conservation by Dr. J. A. Sinden (University of New England) and Dr. W. F. Musgrave (senior lecturer in agricultural economics at the same university); recreational aspects by R. D. Piesse, Director of the Australian Conservation Foundation; management problems of national parks by Dr. J. D. Ovington, head of Department of Forestry, ANU, Canberra, and an expert on international conservation; the role of public opinion in conservation, appropriately by Judith Wright (Mrs. McKinney), writer and poet, president of Wildlife Preservation Society of Queensland and former editor of its journal, *Wildlife in Australia,* and very active recently in demanding action to save the Great Barrier Reef; and, finally, international perspectives in nature conservation by Dr. William C. Robison, an American geographer interested in national parks and familiar with Australia after several long visits.

Part II consists of a setting-out of just *what* we have that deserves and urgently needs conservation. Australian ecosystems and their origins are discussed by Dr. J. Le Gay Brereton (Associate Professor of Zoology, University of New England), Dr. B. N. Richards (Dept. of Botany in that university) and J. B. Williams, ecologist of subtropical rainforests, montane beech forests and the kind of coastal sand-deposit rainforests at present threatened at Cooloola. The Australian flora is dealt with by J. G. Tracey (CSIRO ecologist, Brisbane), Dr. L. J. Webb (ditto), and Dr. W. T. Williams, 'the computer botanist', formerly of the University of Southampton but since of Canberra and Brisbane, a member of the Fauna and Flora Committee of the Australian Academy of Science. Re-

ference is made to Australia's many primitive plants and 'living fossils', and to the unique 'accessibility' here of such a wide variety of plant species, the dominance of evergreens and the absence of succulents. L. J. Webb deals with chemical research on Australian plants. The vertebrate fauna is treated by J. H. Calaby, CSIRO taxonomic mammalogist who has published much about our kangaroos, and Dr. Elizabeth N. Marks (University of Queensland entomologist, a leading expert on mosquitoes in the tropics) deals with the invertebrates. Dr. Donald F. McMichael, first Director of the Australian Conservation Foundation and now Director of National Parks and Wildlife in New South Wales, takes as his subject marine national parks.

Part III consists of a description and assessment of the status quo in each State with regard to national parks and conservation reserves, together with a discussion of current management problems, administration and legislation, and a look into the future towards the achievement of at least a 5 per cent figure of the total land area to be set aside in perpetuity and unassailability. Derek Whitelock, Adult Education Department, University of Adelaide (who organized the conservation seminar when doing similar work at New England), describes New England National Park, Gibraltar Range National Park (near Grafton, shockingly ravaged by a fierce bushfire in 1964, but in charge of a typically dedicated ranger) and Dorrigo National Park.

New South Wales in general is dealt with by staunch conservationist Allen Axel Strom, Queensland by J. K. Jarrett, secretary of the National Parks Association of Queensland, and Tasmania by Dr. J. G. Mosley, assistant director of the Australian Conservation Foundation. Our own F.N.C.V. council member and leading conservationist, J. Ros Garnet, who has played a leading part for so many years in almost every society working for these aims (such as V.N.P.A., S.G.A.P. and N.P.P.S.), contributes an excellent chapter on the national parks and nature conservation areas of Victoria, telling the story from the sad rape of Tower Hill through the almost inadvertent reservation of areas that were considered useless for grazing and the successes of naturalists' agitation from time to time, down to the present era, with some items on the credit side but considerable debits too. Recommendations for a more representative National Parks Authority and the lessening of political interference are made.

South Australia's position is reviewed by C. Warren Bonython, President of the Nature Conservation Society of S.A., Western Australia by Vincent Serventy, present editor of *Wildlife in Australia,* author of natural history books and widely known for his 'Nature Walkabout' television films, and Northern Territory by Colonel Lionel Rose, chairman of the N.T. Reserves Board and author of the booket on Ayers Rock—Mt. Olga National Park.

This is a long review, but its length is justified by the supreme importance of the theme of the book, which it is hoped will have a wide sale because all royalties will be donated to the Australian Conservation Foundation. The rate at which destruction is still being carried on, especially in Queensland and Western Australia, is heartbreaking, and the more publicity there is of this type and of the two lavishly illustrated 'coffee table' books on national parks recently published the more likelihood there is of a better climate of opinion on the urgent necessity of conservation.

J. A. Baines.

Australian Seashores in Colour

by Keith Gillet and John Yaldwyn.

A. H. & A. W. Reed, 1969.

Pp. 112, 52 col. pl1. and numerous b.&.w. figs. $3.95.

This is one of the best of these publishers' series of small natural history books. The text provides detailed information on both general Australian marine biogeography and life histories of Australian marine animals, and the plates attain a superbness not usually found in works of natural history for the general reader at this price.

The opening chapters include maps showing the warm and cool currents affecting Australia and the distribution of the continental shelf. They also give a good introduction to understanding and observation of the varying waters and shores. The clear and well labelled diagrammatic drawing of a representative animal for each of several groups exemplifies the authors' aim to instruct as well as captivate.

Unfortunately the Phyla are not clearly set out. There is a marked unevenness of treatment of animal groups, and to illustrate minor shortcomings, penguins would be more properly grouped with oceanic than with shore birds.

Nevertheless this book has the value of being a reference work as well as one which stimulates interest in a striking fashion pictorially.

A. R. McE.

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FIELD NATURALISTS CLUB OF VICTORIA

General Meeting 11 *March*

The meeting was attended by approximately 80 members and friends, and chaired by the Vice-President, Mr. T. Sault, in the absence of the President, Mr. E. Allan, now on an overseas trip.

It was moved by Mr. J. Swaby, seconded by Mr. Bishop that the Minutes of the General Meeting held on 9 February, 1970 be taken as read. A motion was moved by Mr. Woollard and seconded by Mr. A. Fairhall that the Minutes of the Annual General Meeting held 12 March, 1969, be taken as read.

Mr. T. Sault extended wishes on behalf of the Club for a speedy recovery to Mr. Hooke, Mr. Hanks and Mr. F. Zirkler who are on the sick list.

New members whose names appear in the March, 1970 Vic. Naturalist, were elected on the motion of Messrs. Cooper and Morrison.

The Treasurer's Report was presented by Mr. D. McInnes, who moved that the Balance Sheet and Statements as published in the *Victorian Naturalist* be adopted. This was seconded by Mr. J. Willis and carried with the approval of the meeting. Mr. McInnes commented on the deficit shown and said that this was due mainly to loss of membership and consequent loss of subscriptions, also to loss of advertising revenue. The continued excellent work done by Mrs. Strong as Sales Officer was commended by Mr. McInnes.

The Treasurer moved that the present Auditors, Danby Bland & Co., be appointed for the coming year. Seconded by Mr. Douglas.

Mr. T. Sault observed that considering the flood of books dealing with natural history on the market today, and the wide and increasing interest in the subject it would seem that membership should be growing.

The F.N.C.V. Office-Bearers for 1970-1971 are:—

President: Mr. T. Sault
Vice-Presidents: Mr. J. Strong, Mr. P. Curliss
Secretary: Mr. D. Lee
Asst. Secretary: Mr. R. Condron
Treasurer: Mr. D. McInnes
Asst. Treasurer: Mrs. E. King
Editor: Mr. G. Ward
Asst. Editor: Mr. P. Gahan
Librarian: Mr. P. Kelly
Asst. Librarian: Miss M. Lester
Excursion Secretary: Miss M. Allender
Residual Councillors: Mr. A. Fairhall, Mr. A. Lewis, Miss M. Morgan, Mrs. P. Strong.

It was moved by Mr. A. J. Swaby, seconded by Miss M. Allender that the 90th Annual Report by the Secretary as published in the March, 1970 issue of the *Vict. Nat.* be adopted.

Mr. Swaby brought to the notice of the meeting three points from the Secretary's report for their further consideration.

These were:—

(a) This was the 28th anniversary of the formation of study groups within the Club and more group activity should be undertaken.
(b) In answer to the question "what can the concerned citizen do", there was a need for greater co-operation with country clubs as opposed to individual action.
(c) The Little Desert issue is not dead. The necessity for continued vigilance and interest in political moves on this subject was paramount.

Mr. Swaby concluded by moving a vote of thanks to the officers and Council for the past year's efforts. Seconded by Mr. Strong.

Correspondence:

A form was received from the Natural History Medallion Secretary asking for a nomination for this year. Council has nominated Miss Jean Galbraith, and a request for the setting up of a sub-committee to complete a dossier was put forward.

Support for the Bannockburn Wildflower Reserve as requested by the S.G.A.P. has been approved.

The meeting was informed of the death of Mr. Charles Gardner in West Australia; Mr. Gardner was the recipient of last year's Medallion.

It was moved by Miss J. Woollard and seconded by Mr. P. Curliss that the correspondence be received.

Subject for the Evening:

Under the title of "Conservation '70", a panel of three members, Messrs. J. Ros Garnet*, R. Johnson and D. Lee, spoke on different aspects of conservation.

* The lecture of this speaker will be printed in full in the *Vict. Nat.* for May.

Mr. R. Johnson, President of the B.O.C. used the title "Conservation — who cares?" for his talk. He stated that Govt. Depts. were required to control large areas within economic terms and although staff were competent, natural history studies were not particularly encouraged. Text books were not made available out of public funds. Do people using National Parks and Reserves care? The heaps of rubbish, bottles, cans, left lying about, lighting of fires, and the vandalism by shooters all contributed to making the rangers' jobs difficult, leaving no time for other matters.

Fraser National Park was an example where two excellent men were doing good work but the pressure of people was becoming too much.

Politicians did little more than satisfy their electors to a minimal degree. This was demonstrated recently when only one political party took advantage of help and advice from natural history bodies when a much publicised conservation issue was raised.

Scientists were usually more concerned with research than the subject but a new course at New England University on conservation was a start for greater studies at ths level.

The public image of natural history clubs was unfortunate in that members were regarded by many as "cranks", "bug-hunters", and "compulsive letter writers". A new aproach to the public was called for to attract new members by spreading propaganda in the right quarters. This could be done at the Nature Show, and by getting people with commercial interests in towns and country areas conservation minded. As a result the attraction of tourists could be a boost for their areas.

Money was found for almost everything except reserves, so people had to be convinced of the benefits that would accrue from conservation, the need for an appreciation of the aesthetic values, and the need for the protection of what had been conserved.

The Little Desert issue was an example of what could be done. Members of Parliament were bombarded with the greatest spate of letters and petitions in the history of Victoria and this helped to delay the program. The climate of conservation is very favorable at present, due largely to interest raised by the Little Desert controversy, making prospects for future projects very good.

The third speaker, Mr. D. Lee stressed the need for more active participation by members in collecting data and correlating information on certain localities. A mine of information was contained in the *Vict. Nat.* magazines but it was unavailable in its present form and needed to be collated so it could be used as a reference for particular areas. A case in point was the flora of the Sandringham Heathlands, Brighton and Beaumaris districts. This encompassed 250 square miles and was comprehensively described in the *Vict. Nat.* in 1912 by Dr. Charles Sutton; but none of this area had been preserved. Surveys of areas should be made as information gained may contain answers as to why pollution occurs and other problems. He concluded by observing that the basis of Natural History was history and members should put "history" back in "natural history".

Questions were addressed to the speakers on the litter problem. Mr. Cooper spoke of the issuing of 10,000 plastic litter bags to visitors over a holiday period at Wilson's Promontory. This had been very successful as only 5% were discarded.

Mr. Douglas commented on the great interest in natural history by the public because of the many letters he received in the course of his work as a journalist. He also made reference to the work done by the Mammal Survey Group, who were very active, and the possibility of being able to provide data on the Maribyrnong River Catchment Area, required by the Board of Works.

Miss J. Woollard suggested more use could be made of radio talk-back programs as an avenue for propaganda.

Mr. T. Sault said that greater interest should be taken in preserving geological features, many being unique to Victoria. It was desirable that members should become more active and older members give a lead to the younger ones with increased support to junior clubs.

Mr. Sault thanked the speakers and was enthusiastically supported by the audience.

Mr. J. Willis spoke on a project undertaken by Camberwell Boys Grammar School pupils during their summer camp at Mt. Disappointment regarding the study of lichen growth and also suggested that another area for research was the growth of porcupine grass.

Announcements:

Mr. and Mrs. J. Strong would be absent for three months during the winter and Miss Mary Morgan offered her services as Book Sales Officer for this period.

Mrs. G. Taylor advised that the quarterly meeting of the V.N.P.A. would be held on 23rd March and the speaker to be Prof. Turner whose subject was "Conservation in Great Britain".

The Save Our Bushland Action Committee would hold a film night with an address by Dr. Malcolm Hall on 29th April. The venue was the Assembly Hall, Methodist Ladies College, Fitzwilliam Street, Kew.

Mr. Douglas announced that a society had been formed for the preservation of an area of 8,000 acres at Mt. Macedon and that plans were in hand to begin work on this proposal.

Exhibits:

A map of the Little Desert and Wyperfeld National Park areas was tabled by Mr. D. McInnes.

Mr. T. Sault showed fan weed, a green algae, under the Microscope.

Mr. A. J. Swaby showed a mat plant, *Sagina procumbens* grown in a pot and a seedling of Homolanthus populif- and a seedling of *Homolanthus populifolius,* the Queensland poplar.

Miss Allender gave details of the Easter excursion to Warrnambool and districts and said that the Warrnambool Club would be leaders. There were still some vacancies.

Mr. D. McInnes advised that there were some vacancies available on the camp-out being organised by the Hawthorn Juniors at Easter to Wyperfeld National Park and the Little Desert. The provision of camp gear and food was necessary.

Botany Group Meeting

12 *February*

There was a good attendance of 28 members and visitors, with Mr. Fairhall in the Chair. After dealing with various business matters, such as the Botany Group exhibit at the Nature Show (an historical subject, the "New Plants" and the botanists of Captain Cook's Expedition), and a program of day and weekend excursions for the year, the subject for the evening was introduced—"The Identification of W.A. Wildflowers". Mr. Fell, who has been living in W.A. for some time, showed slides of beautiful specimens and was able to help with many of the names. He also spoke about and showed slides of the indiscriminate burning and bull-dozing which is occurring in the South-West of W.A. He showed pictures of superb natural gardens near Cape d'Entrecasteaux which were later quite destroyed by burning-off. There were also pictures of the same thing in the beautiful approaches to the Stirling Ranges, due to so-called "protective burning".

Mr. Alan Morrison showed and named clearly many lovely and uncommon flowers, one being the rarely-noticed Lazy Orchid (*Caladenia multiclaira*). Miss M. Elder, Miss E. Jones and Miss M. Allender also showed interesting and helpful slides.

Geology Group Meeting

4 *February*

Twenty two members and visitors attended. The newly elected Chairman for 1970, Mr. Blackburn, occupied the Chair. The Subject for the evening was of Holiday Reminiscenses. Members showed slides and exhibited specimens collected during the holiday recess. Mr. B. Cooper spoke about slides taken on a previous excursion to S.A. These included views of the Pre-Cambrian rocks there, (Adelaide Basement Series), and also Pre-Cambrian Tillite and Permian Tillite. Others included folded Jasperlite (low grade iron-ore) at Iron-Duke. Messrs McInnes and Sault spoke of rocks co llected on the Bogong High Plains and exhibited specimens and microscopic slides of some of these. Also exhibited from this area were fossilized leaves and plant remains in shale underlying a thin seam of coal under Tertiary Basalt at Bundarrah River. Mr. Dodds spoke of Glacial Pavements at the newly built Commadai reservoir. Many of these have now been inundated by the rising waters. He reminded members that anyone wishing to collect fossil Ostracods should do so before the winter rains as the bed containing the fossils may be permanently covered with water.

Other exhibits:—

Miss Pertinac—Tourmaline and Garnet, Wodonga.

Mr. Holmes—Fossil shells, (Permian) collected during the Hawthorn Juniors Christmas excursion to Tasmania.

Mr. Taylor—Gabbro, Waratah Bay. Chalcedony, Laverton, W.A. Selwynite, Heathcote. Volcanic bombs, Mt. Porndon.

Mr. Dodds—Muscovite, India. Silver-Lead-Zinc Ore, Parnell Mine, Broken-Hill. Opal, Gelantipy.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Wednesday, 13 April—General Meeting at National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—"From Gibbers to Greenery" (Birdwatching across Northern N.S.W. and Southern Queensland). Illustrated with colour slides. Speaker: Miss Helen Aston.
4. New members.

February and March, 1970

(a) *Ordinary*:

Miss Mary Carlisle, 117 Barkly St., North Fitzroy, 3068.
Miss Janey Jackson, 58 Cascade St., North Balwyn, 3104. (Mammals)
Mr. David Moore, 6 Kingsley St., Camberwell. 3124.
Miss Caroline Mountain, 56 Grosvenor St., Prahran, 3181 (Botany)
Miss Jeannette S. Hales, Flat 2/12 Illawarra Rd., Hawthorn, 3122. (Fauna, Flora.)
Miss Catherine Kyne, 22 Lambert Rd., Toorak, 3142.

Joint Ordinary:

Noel Byass, with Mrs. R. Byass, 23 Kingston Rd., Surrey Hills, 3127.
Mrs. J. Gilmour, with Mrs. L. Greenwood, 343 Toorak Rd., Burwood, 3125. (Ornithology, Botany)

(b) *Country*:

Mrs. D. M. Rasche, Private Bag 10, Ultima, Vict., 3544.
Mrs. Helen Begg, "Arran," Portsea, Vict., 3944.

(c) *Junior*:

Harold E. Parnaby, 35 Campbell St., Castlemaine, Vict., 3450.
Francis Payne, Flat 299/332 Park St., South Melbourne, 3205.
Alan Burns, 11 Ivanhoe Gve., Chadstone, 3148.

5. General Business.
6. Nature Notes and Exhibits.

Monday, 11 May—Banksias and their Relations of the family Protaceae. Speaker: F. J. Rogers.

F.N.C.V. EXCURSIONS

Sunday, 12 April—Botany Group excusion to Macedon area. Meet 10.55 a.m. at Macedon Station or contact Mr. K. Kleinecke (Phone 25-2415) regarding transport.

Sunday, 19 April—Werribee Gorge. Leaders Mr. J. Myers and Mr. D. McInnes. The coach leaves Batman Avenue at 9.30 a.m. fare $1.60. Bring one meal and a snack.

GROUP MEETINGS

All members of the club are welcome at Group Meetings. 8 p.m. at National Herbarium unless otherwise stated.)

Thursday, 9 April—Botany Group. Miss M. Lester wil speak on "Myrtaceae".

Wednesday, 15 April—Microscopical Group.

Friday, 24 April—Junior meeting at Hawthorn Town Hall at 8 p.m.

Monday, 4 May—Entomology and Marine Biology Group meeting at 8 p.m. at the National Museum in small room to theatrette.

Wednesday, 6 May—Geology Group. Speaker—Mr. K. Hammond. Subject—Basin Evolution.

Thursday, 7 May—Mammal Survey, Group Meeting at Sir Arthur Rylah Institute, corner of Stradbroke Ave. & Brown St., Heidelberg, at 8 p.m.

Thursday, 14 May—Botany Group. Mr. J. Barnes will speak on The Botany of Captain Cook's Voyages.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Mr. T. SAULT

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Hon. Librarian: Mr. P. KELLY, c/o National Herbarium. The Domain, South Yarra 3141.

Hon. Excursion Secretary: Miss M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

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Magazine Sales Officer: Mr. B. FUHRER, 25 Sunhill Av., North Ringwood, 3134.

Book Sales Officer: Mrs. J. STRONG.

Group Secretaries:

Botany: Mrs. R. WEBB-WARE, 29 The Righi, South Yarra (26 1079).

Microscopical: Mr. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mr. P. HOMAN, 40 Howard Street, Reservoir 3073.

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

Geology: Mr. N. WIGMORE, 56 Brett Street, Murrumbeena 3163 (56 1485).

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1970

Ordinary Members	$7.00
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Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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F.N.C.V. DIARY OF COMING EVENTS
GENERAL MEETINGS

Monday, 11 May—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—Banksias and their Relations of the family Protaceae: F. J. Rogers.
4. New Members.

Ordinary:
Mrs. Emma M. Adams, 5 Rochester Road, Canterbury, 3126.
Mr. John L. Baulch, Flat 6, 10 James Road, Croydon, 3136. (Interest—Mammals.)
Mr. David Pye, 24 Innellan Road, Murrumbeena, 3165. (Interest—Botany and Zoology.)
Mr. F. J. C. Rogers, 108 Wantirna Road, Ringwood, 3134.
Mr. Gary J. Smith, Monash University Department of Zoology, Clayton, 3168.

5. General Business. 6. Nature Notes and Exhibits.

June—"The Tide will Turn": Mr. E. G. Wallis.

July—"A Biological Survey of Victoria": Mr. R. T. M. Prescott. Pescott.

Group Meetings

(8 p.m. at the National Herbarium unless otherwise stated)

Thursday, 14 May—Botany Group. "Orchids" by Mr. I. Morrison. The talk by Mr. J. Baines announced for this date in the last Naturalist will be given in June.

Wednesday, 20 May—Microscopical Group.

Friday, 29 May—Junior meeting at 8 p.m. at the Hawthorn Town Hall.

Monday, 1 June—Entomology and Marine Biology Group meeting at the National Museum at 8 p.m. in small room beside theatrette.

Wednesday, 3 June—Geology Group.

Thursday, 4 June—Mammal Survey Group meeting at 8 p.m. in the Arthur Rylah Research Centre for Environmental Studies—corner of Brown Street, and Stradbroke Avenue, Heidelberg.

Friday, 5 June—Preston Junior F.N.C. meeting in Rechabite Hall, 281 High Street, Preston, at 8 p.m.

Thursday, 11 June—Botany. "The Botany of Captain Cook's Voyage". Speaker Mr. J. Baines.

F.N.C.V. Excursions

Sunday, 10 May—Botany Group excursion to the Old Black Spur Road. Meet at the Ringwood Station at 10.15 a.m. Bring one meal and a snack. Would anyone going who would be willing to take another member in the car please notify Mr. K. Kleinecke at 8 Oliver Street, Ashburton (phone 25-2415).

Sunday, 17 May—Tonimbuk area. The coach will leave Batman Avenue at 9.30 a.m. Fare: $1.70. Bring two meals.

Geology Group Excursions

Sunday, 10 May—To Airey's Inlet. Leader: Mr. George Carlos.

Sunday, 7 June—Maribyrnong River Terraces. Leader: Mr. Dan McInnes. (Previously advertised for 10 May.)

Sunday, 5 July—To Cave Hill (Lilydale) Limestone Quarry. Leader: Mr. J. Dobson.

Sunday, 9 August—To Heathcote. Leader: Mr. R. Davidson.

Transport is by private car (spare seats are usually available for those without their own transport). Excursions leave from the western end of Flinders Street Station, opposite the C.T.A. Building, at 9.30 a.m.

Preliminary Notice

A camping trip to Wyperfeld and the Little Desert is proposed for the first week in September and the excursion secretary would like to hear from members interested in the proposal. A coach would be chartered but members would be responsible for their own meals and camping gear.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: P. Gahan

F.N.C.V.

Vol. 87, No. 5 7 May, 1970

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Front Cover:

The acceptance of a human relationship by some of our marsupials is evident from the photograph of a juvenile Ringtail Possum, which was fostered by members of the Goode family, after the death of its mother.

Photo: J. Goode.

Oil Glands in the Bark of Victorian Eucalypts

by

STELLA G. M. CARR* and D. J. CARR*

The use of the common name "scent bark" for *Eucalyptus aromaphloia* may give the impression that the species is unusual in having aromatic bark. Costermans (1966) mentions only one other species (*E. bridgesiana,* "Apple box" or "But-but") as having scented bark.

At the end of the present paper we list 28 of the eucalypt species of Victoria which show this character. The aromatic property is due to the presence of oil glands in the bark (in the Victorian species, in the secondary phloem) of both stems and roots. In the stems they occur in several different patterns, either scattered throughout the bark or more or less confined to the phloem rays, which may be considerably expanded in the outer bark (Plate 2, Fig. 2). In some Northern Australian and Western Australian species the glands occur chiefly in the layers of vertical parenchyma which alternate with the bands of fibres and sieve tubes in the phloem. In the roots they occur mostly in the phloem rays in the Victorian species (Plate 1, Figs. 2 & 3). The oil secreted by the bark glands has the same properties and qualitatively, but not quantitatively, the same composition as that in the leaves (Smith, 1916 for *E. macarthurii;* Baker and Smith, 1920 for *E. bridgesiana;* Lassak and Southwell, 1969, for *E. crenulata*).

The Victorian species with bark glands are those included in Macrantherae-Normales with the addition of *E. ovata* and *E. ovata* var. *grandiflora* from Macrantherae. (Nomenclature in this paper follows that of Johnston and Marryat in Blakely, 3rd Edition, 1965.) That some eucalypts have oil glands in the bark has been known since 1875 when Moeller (1875, 1882) published the results of investigation of specimens of bark of *"E. viminalis"* and *"E. stuartiana"* sent to him by Mueller (1879-1884). The identity of the specimens sent is in some doubt, as pointed out by Welch (1922). Mueller (loc. cit.) was clearly dubious of Moeller's findings since he reports only "kino spaces" in the bark of *"E. viminalis"*. Curiously, Mueller also reports of *E. globulus* that the "middle bark is without reservoirs of oils, resin and kino", but says nothing of the older bark. Solereder (1908) was also dubious about the correctness of Moeller's work—possibly influenced by Mueller's scepticism. Bark oil glands were re-investigated by Welch (1922) and by Chattaway (1953, 1955). We have recently reported a more complete investigation (Carr and Carr, 1969).

The eucalypts which have glands in the bark do not fall into a single bark category in the accepted sense. *E. viminalis, E. rubida* and *E. bicostata* are smooth-barked ("gums"). *E. goniocalyx* and *E. bridgesiana* have bark resembling that of the boxes. If the species concerned is "half-barked", i.e., with rough bark at the butt and smooth bark above, glands occur in both types of bark. It is important to note that the glands under

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discussion are in the phloem or phloem derivatives. All eucalypts have oil glands in the primary cortex of the young stem, but no eucalypts have them in the cortex of the root. After periderm formation, the primary cortex is eventually cut off and shed, to be replaced by tissues derived mainly from the phloem which form the mature bark (Plate 1). In the majority of eucalypts oil glands do *not* form in the bark. In those species which do have them, the time at which oil glands first appear in the bark is very variable. In some species (e.g. *E. cinerea* and *E. bridgesiana*) glands first appear in the bark of stems which are about three years old, but in species such as *E. globulus* they may not be formed until the stems are between ten and twenty years old. As a rule, oil glands develop in the root bark earlier than in the stem bark. We have found them in roots only 0.5 mm in diameter and their occurrence in such fine roots means that digging or other soil disturbance, involving damage to root systems, releases the essential oil. It is curious that there appear to be no reports of this in the literature.

The surest way to test for the presence or absence of oil glands in the bark is to cut thin sections and examine them with a microscope, but much can be learnt from simple field tests. From what has been said already it is evident that one should avoid, if possible, sampling very young bark. It is equally advisable to avoid very old, weathered bark at the base of the trunk, since, even if the remains of oil glands are present, they may have lost their aromatic oils and so escape detection by smell and also be difficult to identify with a lens. Take a small piece of bark from the trunk at about breast height; crumble it between finger and thumb and smell it. If the bark will not crumble easily, rub two small pieces together. Either treatment will damage the glands (if present) and release the oil. It is advisable to use dry bark for these tests as the characteristic odour of the oil may be masked or less obvious with very wet bark. The glands, if present, can be seen by examining a cut surface of the bark with a hand lens (10x); the cut should be made parallel to the surface of the trunk. Alternatively, the *inside* of a flake of outer bark, similarly examined, may show the oil glands or pock marks where they have been (Plates 2 and 3). It is recommended that the presence of oil glands be tested for by both smell and examination with a hand lens since some species which lack oil glands have large stone cells which can be mistaken for oil glands as they are about the same size. However, in practice we have found that in most species the oil glands are readily recognised when present. In some smooth-barked species the presence of oil glands affects the surface modelling of the bark. Small hemispherical depressions and projections mark the sites previously occupied by glands.

We have examined all the Victorian species listed in Blakely with the exception of *E. maidenii* var. *williamsonii* (Mallacoota Gum) *E. paradoxa* (Metung Blue Gum) and *E. viminalis* var. *rhynchocorys* (Snowy River). All these forms are placed in Macrantherae-Normales and although their validity as taxa is questionable it would be of interest to examine their barks. *E. studleyensis* which is presumed to be of hybrid origin (*E. camaldulensis* x *E. ovata*) has no glands in the stem bark which seems to suggest that it is closer to *E. camaldulensis* than to *E. ovata*. The red gums have no bark glands.

The only two anomalous Victorian species are *E. kitsoniana* and *E. neglecta*. In New South Wales, *E. quadrangulata* is also anomalous. These species have very many features in common with typical members of Macrantherae Normales but, as far as our investigations go, the Victorian species have no glands in either the stem or root bark, and the case of *E. quadrangulata* is dubious. Further investigation in the field is necessary to find out whether the absence of glands is a constant feature of these species.

Acknowledgments

We would like to acknowledge our indebtedness to very many people, not least Miss P. Carolan, for field collections of bark.

Victorian species with bark glands

aggregata, aromaphloia
bicostata, bridgesiana
camphora, cephalocarpa, chapmaniana, cinerea, corticosa, crenulata, cypellocarpa
dalrympleana
glaucescens, globulus, goniocalyx
mannifera ssp. maculosa, maidenii
nitens, nortonii
ovata, ovata var. grandiflora
perriniana, pryoriana
rubida
smithii, st. johnii
viminalis
yarraensis

New South Wales species (other than any listed above) with bark glands

acaciaeformis, angophoroides
badjensis, baeuerlenii, banksii
corticosa
dunnii
macarthurii, malacoxylon, mannifera ssp. gullickii, mannifera ssp. praecox
nicholii, nova-anglica
parvifolia, pulverulenta
scoparia

Tasmanian species (other than any listed above) with bark glands

archeri
cordata
divaricata
gunnii
johnstonii
morrisbyi
rodwayi
subcrenulata
unialata, urnigera
vernicosa

Species of Macrantherae Normales, other than those listed above, with bark glands

antipolitensis
huberana (South Australia)
mortoniana

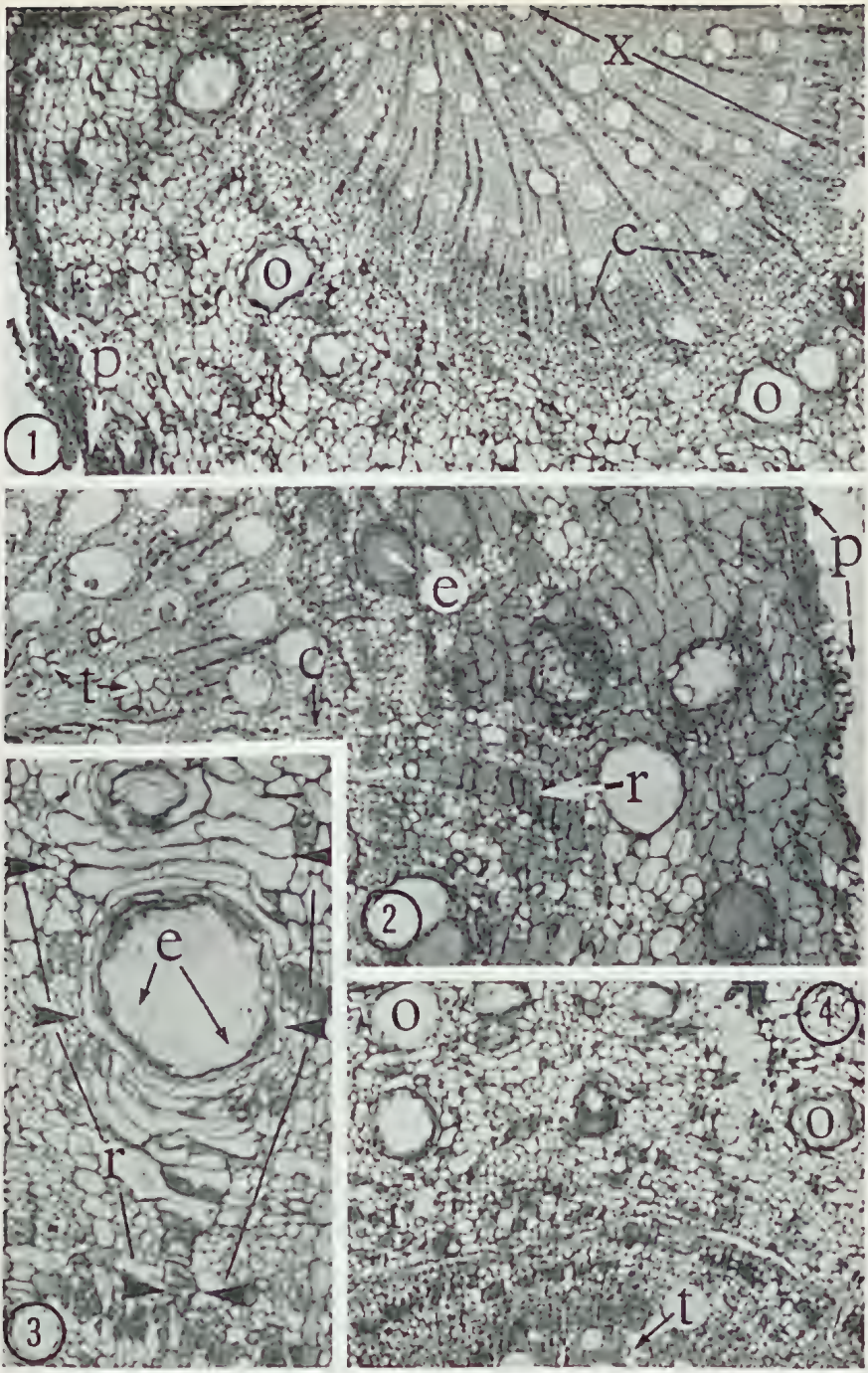
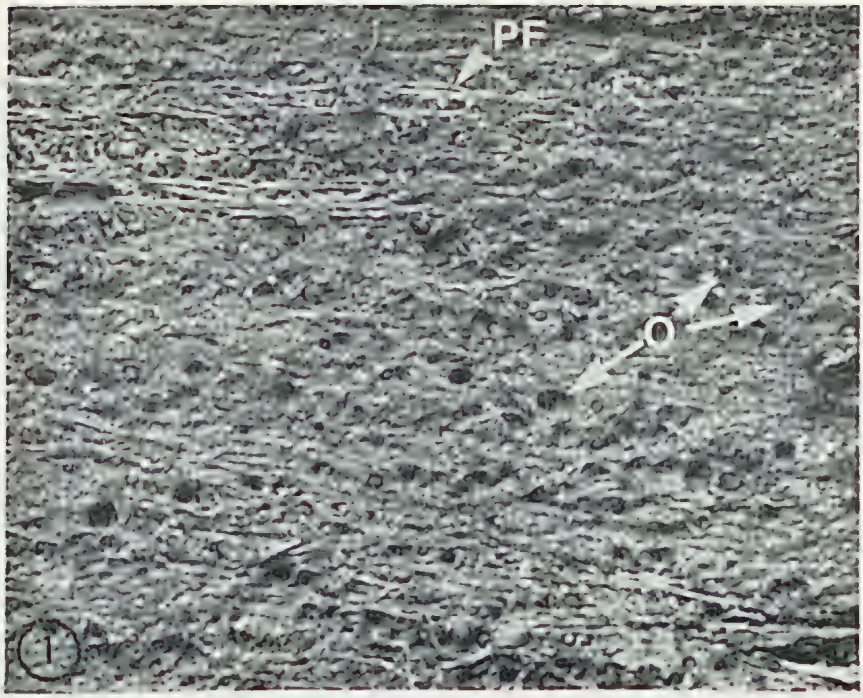


Plate 1. Transverse sections of the bark of roots.
C = cambium; E = epithelial layer of gland; O = oil gland; P = periderm; R = ray; T = tyloses in xylem vessels; X = xylem.
Figure 1. *E. cinerea* (x 56) (diameter of root = 3 mm.).
Figure 2. *E. cephalocarpa* (x 65).
Figure 3. *E. aggregata* (x 150), to show glands formed from parenchyma of an expanded ray. Figure 4. *E. dalrympleana* (x 65).

Plate 2. Photographs of surfaces of bark, cleaved parallel to the surface of the trunk.
O = oil gland; PF = phloem fibres; R = expanded ray.
Figure 1. *E. ovata* (x 10).
Figure 2. *E. crenulata* (x 10).



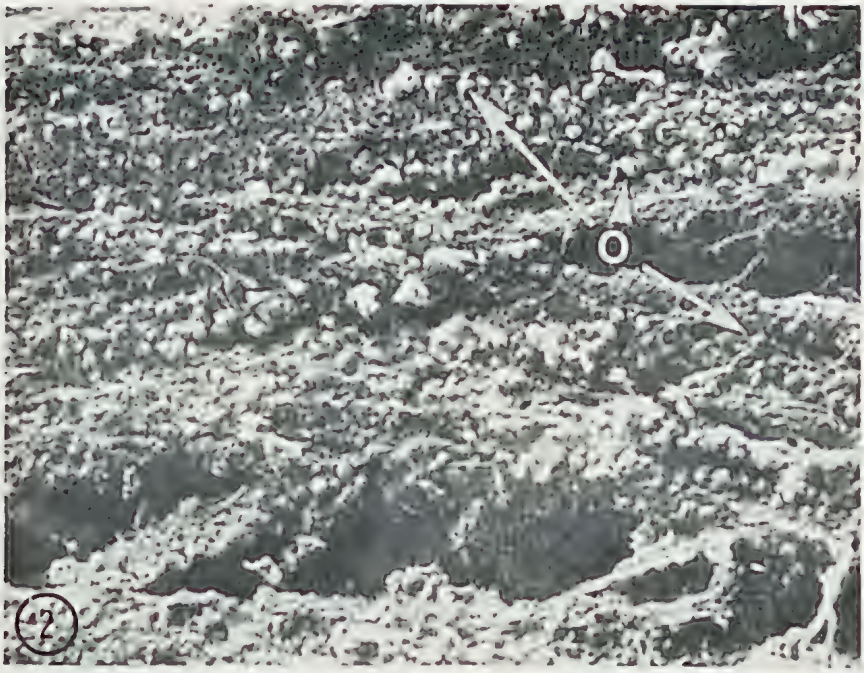


Plate 3. Photographs of surfaces of stem bark, cleaved parallel to the surface of the trunk.
Figure 1. *E. cephalocarpa* (x 9).
Figure 2. *E. nortonii* (x 6.8).

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Nature Reserves in Victoria

How much open space can we afford for the protection of scenery and the preservation of nature?

(Text of an address to members of the Field Naturalists' Club of Victoria, 11 March, 1970, by J. Ros. Garnet)

The U.S.A. National Park Service and its system of national parks is regarded by many as the model for other countries.

Australians in general and Victorians in particular are inclined to evaluate their own national parks in terms of the U.S. counterparts and to seek to have them adjusted to the same standard. But what is the standard? Is it one of quality or quantity or both? Whatever the chosen yardstick, one may be sure that, in the eyes of most people our national parks will never quite measure up to it. Perhaps that is as it should be, for thus, there will be always something to strive for.

Let us first consider the question of quality. Have we anything to compare with the magnificent, spectacular or unique features in the national parks of other countries? The answer will depend upon our interpretation of the adjectives and upon our capacity for wonderment. Those who would reply "No" might well consider that were a foreigner to ask himself the same question in his own country he too would, no doubt say "No". Our attitude is governed by the circumstance that we, like the folk in other lands, inhabit a unique natural environment. Our countryside has indeed its magnificent and spectacular scenery, its elements of uniqueness but, since such attributes are a part of our normal environment, we are apt to deprecate them and, perhaps, even fail to realize that they represent something that is quite peculiar to this great southern continent.

With this thought in mind we might well ask ourselves whether we have kept intact or, at the very least protected, enough of it from the damaging or destroying influences which are part and parcel of the settlement and development of a nation. It is a question which we should strive to answer. Of course, in the process of doing so, we could be troubled by the thought "Why do we want to preserve or protect these things at all?" Possibly some of those who settled on the banks of the Yarra 140 years ago watched with concern the disappearance of their familiar though unique scenery—supplanted bit by bit by all the trappings of a fast-growing human community. Today, who repines the complete suppression of the original native plants and animals that inhabited there? Nobody misses what he never knew and only a few of Melbourne's present million inhabitants will have any conception of what the scene was like so long ago and fewer still, what constituted the Melbournian flora and fauna. Anyway, why should we want to preserve such things?

A one hundred year old building may easily become an object of veneration, a building to be saved for the edification of whom? Posterity? Frankly, I am uncertain whether I can answer the question because I am troubled by the thought that posterity, one hundred years hence, will have at its disposal a collosal number of buildings one hundred or more years old, each with its own special character, legend or tradition. Such things are the product of the skill and craftsmanship of man. He may reproduce them at will but the indigenous trees, shrubs, birds and beasts that once were a part of his close environment, are things he can never resurrect although he can and does readily destroy them.

We are well endowed with sentiment (and I use the word in its best sense). Although we recognize that the passing of the last koala, the last kangaroo, wombat, lowan or lyrebird would not be mourned by the species that yet survived, we ourselves would be deeply concerned should it so happen that the event was brought to our notice. For some 140 years nature lovers have been drawing attention to the gradual extirpation of species of native wildlife and, from time to time, governments have responded by establishing reserves of open space where animals and plants may dwell unmolested and unaffected by the changes going on around them. Those reserves are what we all now recognize as national parks, nature reserves or wildlife sanctuaries—places set aside primarily for the protection and conservation of nature—nature at its best, in its most inspiring garb, in its most interesting and spiritually satisfying guise. We, the human animals, are the only creatures that consciously want these reserves and we want them only that we may, from time to time, visit them to survey our collective conservation handiwork and thereby gain the desired spiritual satisfaction or the anticipated mental stimulus that they afford. We do indeed want them. Thousands of people visit them again and again. In fact, so much are they frequented that there is a considerable danger of their being overrun by the human visitors to the detriment of the very things those visitors come to see and enjoy. The tourist traffic to Wilson's Promontory National Park is now so great as to pose a real problem in maintaining its wilderness condition unimpaired. The problem will be accentuated manyfold in the decades ahead unless the invaders can be encouraged to go elsewhere. But where can they go? What has Victoria to offer them

in lieu of a relaxed and carefree holiday on Wilson's Promontory? — or Mount Buffalo?

There is still a lot of unalienated land of great potential for nature conservation and for public recreation but much of it is waiting to be put to other use—the future farmlands, soft-wood plantations and hardwood forests or for the exploitation of coal and other minerals—oil or uranium or anything at all that is likely to put money into somebody's pocket. Thus we come to examine the implications of the second question. Is quantity a satisfactory yardstick for measuring the degree of sufficiency of our system of nature conservation reserves? At the moment there is little need to use this yardstick in Victoria. We have a long way to go before we need even begin to worry about superfluous acres of national parks. Although we have yet no cause to panic about our deficiencies in nature protection there soon will be if we do not very soon start doing something to remedy them.

Victoria's national parks now occupy 0.9% of the area of the State. However, such a figure is an unreliable guide to the extent of our achievement of a balanced programme of nature protection and conservation. We have no hope at all and, possibly, no need to strive for the 7½% of land surface set aside as national parks in New Zealand or the 5% in Tasmania, but there is still the opportunity for us to establish more national parks without detriment to the economy of the State but with incalculable advantage to its present and future citizens.

Where would we look to find suitable sites?

Our thoughts first turn to our north eastern highlands where 1,400 square miles of territory could be set aside now without seriously disturbing any vested interest. The people of Victoria and their government have been asked to consider a recommendation by the Victorian National Parks Association that a great Alpine State Park be established without delay. The sense of urgency is dictated by the realization that it is vulnerable to despoliation by mining interests, ineffectively controlled cattle grazing and unplanned tourist development. As a properly managed State Park it could, for centuries, fulfill its vital and present role in preserving the water resources of Victoria!

A Kulkyne National Park comprising about 117 square miles of countryside bordered by the Murray River and including one of its greatest anabranch systems was recommended some years ago but the response to the request was the creation of the 68-square mile Hattah Lakes National Park, most of which embraces mallee land with little more than 700 acres of lake. Failure to include the whole of the Chalka Creek anabranch has tended to vitiate this park. The lakes are now dry or almost so and they are likely to remain so unless the normal sequence of flooding is allowed to take place.

An extension to Mallacoota National Park by approximately 35 square miles is still under consideration ten years after the proposal to extend it was submitted to the government! So long as this proposal is neglected the Howe Ranges and their amazingly rich rain forest associations will remain in danger of destruction by some commercial interest.

Nearly 10 square miles in the Brisbane Ranges await dedication but progress in bringing the proposal to a conclusion has been so slow that whatever eventuates will have but little resemblance to the original conception. It is certain that important biological

communities will be lost because of quite needless procrastination.

Nearly 136 square miles of that remarkably interesting area — the Little Desert — have now been reserved as a national park but, although its size makes it a significant conservation area there still remain several extremely important ecological associations and physiographic features in that 600 square-mile "Desert" that lie outside the boundaries of the new park—simply because those who made the choice never bothered to consult those who knew something about the biological requirements of nature reserves.

Even had all the above-mentioned recommendations been adopted in their entirety Victorians would still be far short of a desirable minimum of nature conservation reserves.

Where else to look? Or rather, what else in Victoria is so outstandingly significant as to deserve, even require, incorporation into the national park system? Are all the major geological formations in Victoria adequately represented in the present and proposed parks? Such formations are the key features we should look for in assessing the deficiencies. Each possesses its own distinctive land forms, scenery and wildlife communities. There is no national park in the Central Highlands — the region of our extraordinary mineral springs. There is no national park to embrace the great Carboniferous sandstone formation so magnificantly revealed in the Grampians. There is nothing to typify one of the world's most extensive lava flows—the basalt plains of the Western District and the Keilor and Werribee Plains; little indeed to exemplify the region where occurred Victoria's most recent volcanic activity; nothing to remind us of an event that largely shaped the contours of a substantial part of the State some 200 million years ago when vast glaciers of Permian times moved across the face of what is now Victoria; nothing to help us to cast our minds back to the very beginning of time when the Cambrian and pre-Cambrian rocks were laid down more than 600 million years ago. Heathcote is the place to see the phenomenon of such rocks exposed for those who wish to see but there is no national park there. At no point along its long course does our greatest river, the Murray, come within the boundaries of a national park. The proposed Kulkyne National Park in the form originally planned by naturalists would have remedied that deficiency. There is no national park containing a representation of a drowning river valley with its attendant swamps and lakes. Rather too late it has been found that the draining of almost every available swamp has not been altogether a blessing.

And so one could go on—enumerating land forms and geological formations, each with some unique character which we deem sufficiently significant and scientifically important to warrant permanent reservation. They are important because each differing formation is stamped with its own characteristic wildlife pattern. Each has its own distinctive scenery.

Is it asking too much to invite the people of Victoria to consider seriously the importance of keeping samples of such regions for the "edification, education and enjoyment" of themselves and, as well, those who are to follow. We think not.

It is surely better that we reach a decision now because the future may be too late. The things we most admire have a disconcerting habit of vanishing before our eyes.

Victorian national parks as at 1st January, 1970

Name of Park	Square miles	Acres	Rods	Perches
Wyperfeld	218.375	139,760		
Wilson's Promontory	188.868	120,875	-2	-20
Little Desert	135.734	86,870		
Hattah Lakes	68.750	44,000		
Mount Buffalo	42.630	27,280		
Lower Glenelg	35.	22,400		
Kinglake	22.026	14,096	-3	-39
Mallacoota Inlet	17.539	11,225		
Fraser	12.103	7,745	-3	-9
Captain James Cook Memorial	10.469	6,700		
Alfred	8.447	5,406		
The Lakes	8.184	5,238		
Wingan Inlet	7.391	4,730		
Lind	4.503	2,882		
Mount Richmond	3.181	2,036		
Port Campbell	2.734	1,750		
Mount Eccles	1.522	974	-0	-20
Fern Tree Gully	1.519	972		
Churchill	0.745	477		
Glenaladale	0.630	403	-2	-15
Morwell	0.542	346	-3	-2
Tarra Valley	0.492	315	-0	-18
Bulga	0.142	91		

Area of Victoria = 87,884 sq. mls. = 56,245,760 ac.

Area of national parks = 791.526 sq. mls. = 506,575 ac. = 0.9007% of the area of the State.

Significant additions approved by Parliament in December, 1969:—

Little Desert 84,000 acres.

Yanakie (addition to Wilson's Promontory) 17,900 acres.

Allotment at Refuge Cove (addition to Wilson's Promontory) 8 ac. 2 r. 20 p.

Rabbit Rock, Ramsbotham Rocks, Dannevig Is., McHugh Is. and Great Glennie Is. (additions to Wilson's Promontory National Park) 588 acres.

Morwell National Park 5 acres 2 perches.

Fern Tree Gully National Park 11 acres 3 r. 12 p.

Lower Glenelg National Park 22,400 acres.

Captain James Cook Memorial Park (Cape Everard) 6,700 acres.

Kinglake National Park 3 acres, 3 r. 1 p.

Notes on the birds of Big Green Island, Furneaux Group, Tasmania. 1965-1968

by

F. I. NORMAN*

Introduction

Big Green Island lies three miles to the west of Whitemark, Flinders Island at 41°01' S. 147°59' E. (see Fig. 1.). The island, of about 240 acres, has been the site of studies of some aspects of the ecology of *Puffinus tenuirostris*, the Tasmanian muttonbird. The observations presented below, on other species, have been made during the course of this programme.†

The island was visited for one week each month from October 1965 to May 1968; additional visits were made in February and April 1965 (Table 1). Because of other work it was not possible to cover the island completely each day and therefore some species may have escaped attention.

The vegetation and general features of the island have been described elsewhere (Norman, 1966). Basically the island flora is of a grassland type, *Hordeum, Bromus,* etc., with the coastal tussock belt (see Plates 1 and 2). There is now no extensive indigenous flora, or scrub, and only about half of the vascular species recorded are native. The island is within the belt of prevailing westerlies, having an annual rainfall of around 30 inches and mean temperatures in the range 5.7 to 22.4°C. The sandy soil, derived from underlying granite and dune limestone, has given rise to a vegetation capable of supporting a high stocking rate of sheep which may reach 1,000 in some years though the average lies around 800 (per H. B. Blundstone).

Several Bass Strait islands have been visited in the past (e.g. Mattingley, 1938; White, 1909) but no long-term reports of observations have been published. The present observations

TABLE 1.

Observation periods on Big Green Island, Furneaux Group, Tasmania.

MONTH	YEAR			
	1965	1966	1967	1968
January	27-31	5-12	5-12	4-11
February	1-8	3-10	2-9	2-10, 29
March		3-10	3-9, 30, 31	1-6
April	6-13	1-8, 29, 30	1-6	5-11
May		1-5, 27-31	18-25	3-10
June		1	15-22	
July		5-11	13-19	
August		18-25	10-18	
September		16-22	7-14	
October	7-13	13-21	5-12	
November	5-12	12-19	2-9	
December	2-9	8-14	1-7	

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† Finance for studies on certain aspects of the ecology of *P. tenuirostris* has been provided by the M. A. Ingram Trust and the Frank M. Chapman Memorial Fund and is gratefully acknowledged.

were made both to provide information on the avifauna of a Bass Strait island and to add some data to the little currently known of passerine migration across Bass Strait.

The annotated list given below follows the R.A.O.U. Checklist (1926). Summaries are given excepting when the species was seen on five or less occasions. Additional records for the species recorded in the Bass Strait region are given in Green (1969).

Systematic list of species observed

R.A.O.U. Number

5. *Eudyptula minor*. Fairy Penguin.

Some 200 pairs nest on the island, mainly on the south-eastern and southern end though they are also present amongst muttonbird colonies along the northern coast.

68. *Puffinus gavia*. Fluttering Shearwater.

At least three birds, thought to be of this species, were seen about 100 yards offshore during strong westerlies in October 1967.

71. *P. tenuirostris*. Tasmanian Muttonbird.

Large rookeries (nesting colonies) occur over the island (see Fig. 2 and Plate 3) and it is estimated that about 10,000 breed. Campbell (1900) and Lord (1908) suggested that there had been a reduction in area covered by rookery. No native mammalian predators exist on the island, and snakes were removed shortly after the island was inhabited (Brownrigg, 1872). Pacific Gulls and Sea Eagles have been observed eating muttonbirds (see below). This predation is light but intermittent "birding" (harvesting of young birds by humans) takes place.

Birds have been observed offshore in early September, (12 Sept. in 1967) and mating individuals seen in October.

79. *Macronectes giganteus*. Giant Petrel.

Seen twice only, 20 October, 1966 and 12 Septemebr, 1967, after strong westerlies on both occasions.

90. *Diomedea melanophris*. Black-browed Albatross.

Observed only once, 12 September, 1967. However a skull found on the northern end was either this species or *D. chrysostoma* (A. R. McEvey, *in litt.*).

91. *D. cauta*. Shy Albatross.

Several individuals were frequently seen feeding offshore after westerlies. They were not recorded throughout the year, and apart from one record in May, sightings were from September to December. The largest number recorded was of 100+ individuals between Green, Cape Barren and Chappell Islands, in September 1967 after westerly gales.

96. *Phalocrocorax carbo*. Black Cormorant.

Seen infrequently offshore around the northern end and along the reef during the late spring and summer, the species presumably breeds in the region though not on Green Island. Green (1959) recorded the species as breeding on the south east of Flinders Island.

99. *P. fuscescens*. Black-faced Cormorant.

A breeding species, nesting on the northern reef. 92 nests were found in December, 1965, formed mainly of *Posidonia;* of these 45 contained young and five had two eggs, the remainder being empty. By October, 1966, there were 69 nests; 16 with one egg, 29 with two and seven with

three, the others being empty. By December no occupied nests were present and activity had shifted to a previous roosting area where there were 46 nests, three with one egg, one with two and one with three eggs. Only two young hatched in the new site and it seems likely that heavy seas were responsible for the desertion of the first site and for the low production of the second, though human disturbance is not to be discounted.

104. *Sula serrator.* Gannet.

Occasional birds were observed during late spring, summer and early autumn.

106. *Pelecanus conspicillatus.* Pelican.

Several birds, with a maximum of six, seen throughout the year.

112. *Hydroprogne caspia.* Caspian Tern.

Three pairs bred on the island. Birds were absent from April to September, eggs were laid in November. One nest, of three eggs, was observed in each year and produced two, one and one young respectively.

115. *Sterna bergii.* Crested Tern.

Large numbers were seen throughout the year, with a maximum of 100+ recorded in February, 1965, but no evidence of breeding on Green Island has been found.

118. *S. nereis.* Fairy Tern.

Several pairs of this species were seen on the island from September to February. Though no nesting has been observed, the aerial butterfly display, an indication of breeding ac-

FIGURE 1. Relationship of Big Green Island to Flinders Island, with positions of other islands mentioned in the text.

FIG. 2. Distribution of *P. tenuirostris* rookeries on Big Green Island, Furneaux Group, Tasmania, in October, 1965. (The location of the 'Bay' and 'reef', mentioned in the text, is shown.) (Scale 1" — c.440 yards or 400 metres.)

tivity, has been observed on several occasions.

125. *Larus novae-hollandiae.* Silver Gull.

About 200 pairs breed on the northern end of the island but breeding success appears to be low since few young were seen. Possibly egg predation by the Raven was responsible and young were also taken by Harriers and adults by Sea Eagles (see below). Though several birds were present throughout the year, there was a marked decrease in numbers after April and a corresponding increase in September.

126. *L. pacificus.* Pacific Gull.

At least two pairs breed in the northernmost reef, two young and two eggs being found in December, 1965, two eggs in October, 1966, and one egg and one young in December, 1967. During the November to January period the island received a large influx of young to the extent that, in November, 1966, 70 per cent of the island total of 31 birds were immature.

The Pacific Gulls role as a predator of muttonbirds is limited, though it has been observed eating young. An opportunity was taken during the muttonbirds' 1966-1967 breeding season to assess the predation caused by this species. A rookery was kept under observation for one half hour before dusk and Pacific Gull numbers noted. It was intended that muttonbird corpses would be counted and expressed as a percentage of the breeding total. None was found and the only predation seen, two young taken from burrow entrances, took place in a neighbouring rookery. The patrolling behaviour of gulls, in which burrow entrances are searched, is opportunistic in that only birds immediately at the entrance would be attainable. Insects are also taken during patrolling activities

129. *Arenaria interpres.* Turnstone.

Only two seen during the programme, on 4 December, 1967.

130. *Haematopus ostralagus.* Pied Oystercatcher.

The island had a breeding population of about ten pairs which remained throughout the year and large flocks occurred during August. Copulation has been observed in October and eggs found in November, but apparently pairing-off occurs before this. From July onwards, pairs indulge in aerial display. Nests of this species and of the Sooty Oystercatcher, were found slightly above high water and usually contained three eggs; one, on a sheep track about 20 feet above H.W.M., was not successful.

131. *H. unicolor.* Sooty Oystercatcher

Approximately ten pairs bred on the island in each year. The display flight described for the Pied Oystercatcher has been observed from August onwards and mating seen in October.

133. *Lobibyx novae-hollandiae.* Spur-winged Plover.

Considered to be a breeding species though only one flying young has been found. The island population was around 15 with a maximum of 31 recorded in May, 1966; the total fluctuated since the birds moved around the islands and to the mainland of Flinders.

136. *Squatarola squatarola.* Grey Plover.

Seen once only, on the reef, 15 October, 1966. This species was not recorded for Flinders Island by Green (1969).

138. *Charadrius cucullatus.* Hooded Dotterel.

Seen infrequently in January, March, April, November and December.

PLATE 1. The coastal tussock belt on Big Green Island, south-east coast, January, 1966.

PLATE 2. View of the main vegetation type on Big Green Island, grassland on the western side of the island, November 1966. Chappell Island in background.

140. *Charadrius bicinctus.* Double-banded Dotterel.

Seen frequently throughout the year, excepting November to February, with maxima of 20+ in June and July, 1966.

143. *Charadrius alexandrinus.* Red-capped Dotterel.

Small numbers, never exceeding four, seen throughout the year. Possible breeding occurs since a young-plumaged bird was present in December, 1967.

149. *Numenius madagascarensis.* Eastern Curlew.

Present in small numbers in almost every month though not between June and September in 1966 and August to November in 1967. Parties, never exceeding 25, were usually observed feeding in the bay and on the northern reef.

150. *Numenius phaeopus.* Whimbrel.

One seen on the reef in October, 1966.

155. *Tringa brevipes.* Grey-tailed Tattler.

Eight seen in January, 1967, around the reef and in the bay. Green (1969) did not record this species for Flinders Island.

162. *Erolia ruficollis.* Red-necked Stint.

Thirteen birds were seen in April, 1966, three in May and 12 in January, 1967.

188. *Notophoyx novae-hollandiae.* White-faced Heron.

Small numbers seen throughout the year though only one or two were present from October to January. In May, June and July the island population in each year sharply increased to a maximum of around 50+ though over 100 were present in May, 1966. The numbers then decreased, possibly indicating a post breeding dispersion.

198. *Cereopsis novae-hollandiae.* Cape Barren Goose.

Guiler (1967) has discussed the status of the species within the Furneaux Group. It would appear that he considered that Green Island has about ten breeding pairs of geese (about one every 24 acres) which

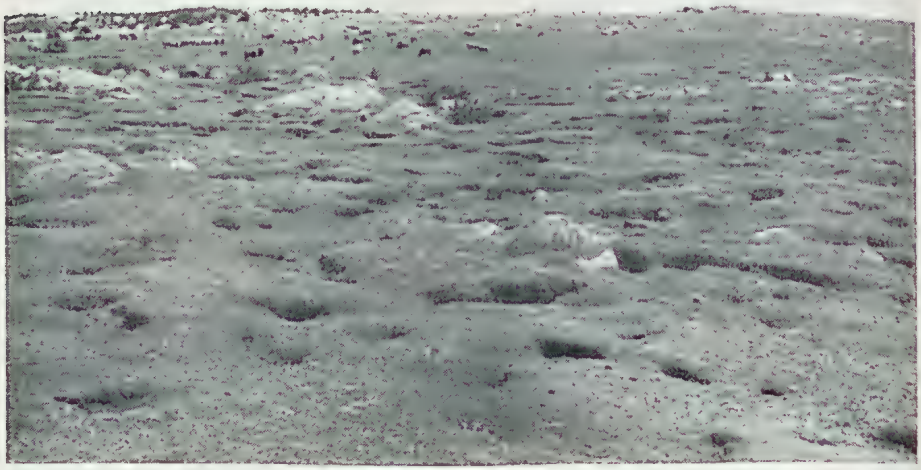

PLATE 3. Typical rookery of the muttonbird, *Puffinus tenuirostris*, on Green Island. Note the utilization of the deeper soils between granite boulders and ridges. January 1966.

produce ten chicks. In this regard it is of interest to compare my findings with Guiler's estimation.

In the 1965 breeding season, nests with eggs, and families of chicks were found in October. There were at least 25 young present in November. Copulation was first observed in July with nests being formed in August, in 1966. Both young and eggs were present during the September visit and a minimum of 18 young were produced during this breeding season. In 1967 at least 23 young were present in November, though nests with eggs and young had been found as early as August. Twelve nests were found during the season and produced, at some stage, 30 young. Since Guiler (*ibid.*) based his estimation on one visit during August, it seems likely that many young resulting from later nesting were missed.

During the observation period, estimates of the maximum number of geese inhabiting the island (during the week's visit) have been made and these are presented in Table 2. It will be seen that the island carries a goose population through the year though numbers are low around the dry summer period. A peak, which reached 200+ birds in 1967, has appeared in both years prior to the breeding season and presumably relates to breeding and non-breeding birds moving through the island, possibly from Flinders Island, to nest on outer islands. This movement may be stimulated by heavy rainfalls following relatively dry conditions since in 1966 and 1967 the peaks were obvious after heavy rains in February, March and May respectively. The mean number present in 1965 was 46, for 1966 the figure was 54, in 1967 the mean was 67 and in 1968 a mean of 82 was recorded.

The island, during my observation period, has carried about 12-15 breeding pairs and produced between 20 and 30 young per season. As a feeding area for local migrants, the island reaches its peak importance shortly before the breeding season but supports mainly breeding pairs for the remainder of the year.

PLATE 4. Eastern side of the island showing the grassland merging into areas colonised by the alien *Lycium ferocissimum*, November, 1966.

Natural predation on the island appears to be limited to egg losses caused by the Raven but young and adults are frequently shot by local residents.

203. *Cygnus atratus.* Black Swan.

Almost all birds were seen feeding on *Posidonia* and *Zostera* beds, in the Bay on the north eastern side though swans were occasionally seen on the grass at the northern end of the island. Usually about five or six birds were present but at least 28 were seen in January, 1966, and a maximum of 15 in March, 1967. Ashby (1928) recorded this species as migrating between Flinders Island and the Victorian mainland.

Small cygnets have been seen during 1966 and 1967 but since no nest was found on the island it is thought that these were bred on Flinders Island.

208. *Anas superciliosa.* Black Duck.

Two birds seen on three occasions, in May and October, 1966, and in April, 1967.

210. *Anas castanea.* Chestnut Teal.

Small numbers seen throughout the year, with a maximum of 31 in May, 1966, and 20+ in May, 1967.

211. *Anas gibberifrons.* Grey Teal.

Occasional birds seen in almost every month though totals rarely exceeded ten birds. At least 40 were present in November, 1965, and 30+ in May, 1967 and 1968.

215. *Aythya australis.* Hardhead.

Seen in small numbers around the Bay in most months, though a maximum of 20 birds were present in January, 1967.

217. *Biziura lobata.* Musk Duck.

Two to ten birds seen monthly in the Bay.

219. *Circus approximans.* Swamp Harrier.

One or two birds regularly visited the island, from Flinders Island, during the September-February period but they were not seen there in the intervening months. Ashby (1928) and Ridpath and Moreau (1966) note that this species migrates across Bass Strait.

The harrier was a predator of the rat, *R. rattus,* on the island and was also observed preying on a young Silver Gull.

226. *Haliaetus leucogaster.* Sea Eagle.

One or two birds were seen on almost every visit, flying in from or returning to the Strezlecki Mountain region on Flinders Island.

The species has been seen fishing on the Bay; on one occasion caused a

TABLE 2.

Maximum counts of Cape Barren Geese on Green Island for the period 1965 to 1968.

MONTH	YEAR			
	1965	1966	1967	1968
January	70+	87	60	50
February	62	27	?	30
March		?*	7	48
April	44	172	60	150
May		86	50	130+
June		36	200+	
July		78	?	
August		43	100+	
September		50	40+	
October	37	28	50+	
November	32	?	40	
December	48	30	40	

* No estimate made; gaps indicate no observations (see Table 1).

Pacific Gull to disgorge a fish which the eagle retrieved. In January, 1967, an eagle took an adult Silver Gull from a flock on the water, plucked the prey on a rock at the northern end and then flew towards Flinders, being mobbed by a flock of 200+ Silver Gulls, Spur-winged Plover and a Swamp Harrier. R. Marriott (*pers. comm.*) has seen adult and young muttonbirds being taken by the species in December, 1967, and March, 1968, respectively.

228. *Haliastur sphenarus.* Whistling Eagle.

Seen during February, 1966 and in March, 1968 (eating a rat).

237. *Falco peregrinus.* Peregrine.

One or two birds seen infrequently throughout the programme.

239. *Falco berigora.* Brown Hawk.

Usually two birds seen during each visit, occasionally observed carrying rats. Food passing between males and females have been seen in January and March.

240. *Falco conchroides.* Nankeen Kestrel.

This species is not known to breed in mainland Tasmania (Ridpath and Moreau, 1966) but it is present on Flinders Island. One or two were seen over the island in almost every month.

242. *Ninox novae-hollandiae.* Boobook Owl.

Dr. D. F. Dorward recorded one in 1967.

306. *Neophema chrysostoma.* Blue-winged Parrot.

Two birds seen over the island in November, 1965, were the only records of this species.

337. *Cuculus pallidus.* Pallid Cuckoo.

A migrant species (Ridpath and Moreau, 1966) which surprisingly was only seen once, on 11 September, 1967.

357. *Hirundo neoxena.* Welcome Swallow.

Small parties of birds have been observed flying north in February, March and April and returning south in August and September. Occasional birds seen in November are, presumably, local breeders.

359. *Hylochelidon nigricans.* Tree Martin.

Mollison (1960) recorded large numbers of birds flying NNE into a wind, between Flinders and Cape Barren Islands in late February. The only records of the species over Green Island support this timing, being of two birds going northwards on 9 February, 1966, and 8 March, 1967.

361. *Rhipidura fuliginosa.* Grey Fantail.

Occasional birds were present on the island, feeding around the prickly box bushes, from August to October and again in April, probably on migration, though Green (1969) considers that they are common on Flinders Island throughout the year. Observations were usually of individual birds but at least four were present in October, 1966.

365. *Myiagra rubecula.* Leaden Flycatcher.

Single birds seen in March and April, 1966.

382. *Petroica phoenicea.* Flame Robin.

Ashby (1928) mentioned that this species migrated across Bass Strait. Birds, usually single, were present on the island in April (1965 and 1966) or (May 1966) and again in October.

448. *Ephthianura albifrons.* White-fronted Chat.

Though small numbers may breed on the island (birds carrying food have been seen in December), no nest has been found. Chats were seen throughout the year, with a maximum

of about 20 in March, April and May. Birds have been observed flying out towards Kangaroo and Chappell Islands and it seems likely that there is considerable inter-island flight in the species.

547. *Artamus cyanopterus.* Dusky Wood Swallow.

A flock of 100+ moved north over the island on 8 May, 1968.

574. *Zosterops lateralis.* Silver-eye.

Ashby (1928) noted that it had been seen crossing the Straits and Ridpath and Moreau (1966) mentioned its habits of partial migration, with some portion of the population remaining within Tasmania over the winter period. On Green Island, small numbers have been seen in every month except November, December and January, with the majority being present in April. These usually inhabited the prickly-box *Lycium ferocissimum* (Plate 2). A flock of more than 200 were seen over the island on 12 April, 1965; they were flying (and calling frequently) at about 500 feet towards the south-east, shortly after dawn. In 1966 no birds were present until March, in 1967 only single birds were observed in February and March and in 1968 the earliest birds were seen in April.

647. *Anthus australis.* Australian Pipit.

A few birds, usually less than five, were seen infrequently in every month excepting January and February.

648. *Mirafra javanica.* Horsfield Bushlark.

Single birds seen during August, September and October, 1967. This was apparently a vagrant since the species is absent on the Tasmanian mainland (Ridpath and Moreau, 1966).

690. *Corvus coronoides.* Raven.

A few birds were seen throughout the year, often flying between Green Island, Flinders, Chappell or Kangaroo Islands. Large flocks, up to 34 birds, appear during the lambing season and small parties clean up refuse left by muttonbirders.

As recorded by Guiler (1967), this species is an egg predator of the Cape Barren Goose. A pair were observed smashing eggs near a nest on the western side of the island (other nests found with broken eggs were possibly the result of the Raven). The birds also apparently take insect larvae from soil, eat dead rats and sheep and scavenge along the shore. Once a pair were observed eating a dead Conger Eel, *Leptocephalus wilsoni,* which had been stranded on the shore.

696. *Strepera arguta.* Clinking Currawong.

One bird observed on 6 February, 1966, originating, probably, from Flinders Island.

Introduced Species

991. *Turdus merula.* Blackbird.

A pair, possibly two, occupied the prickly box thicket on the north east (Plate 4) and it was likely that they bred there.

993. *Alauda arvensis.* Skylark.

Probably a breeding species of about ten pairs, though no nest has been found. The island population seems to be constant around 20 birds but influxes occurred in April and May. In April, 1966, about 100 birds were present and were watched leaving the island towards the north-east.

995. *Passer domesticus.* House Sparrow.

One or two birds occurred on the island throughout the year, excepting the summer months.

996. *Carduelis carduelis.* Goldfinch.

Generally small numbers throughout the year but larger flocks, of up to 40 birds, were present on the island between August and October.

997. *Chloris chloris.* Greenfinch.

Not uncommon on Flinders Island (Tarr, 1950), the species was seen on only one occasion, 6 July, 1966.

999. *Sturnus vulgaris.* Starling.

A breeding species (two pairs) in 1965 and 1966, though not in 1967. The island was utilised as a feeding area by large flocks of birds from Flinders Island, which reached c.400. The birds roosted on Kangaroo Island and flocks crossed Green Island towards Kangaroo before dusk each night in the non-breeding season.

Discussion

The results presented above, from a three year observation period, indicate the limited avifauna of one Bass Strait island. During this study 62 species have been observed, including six exotic species. Of the total, thirteen species breed on the island, including Starling, Blackbird and Skylark, and another four are thought to do so. Only one native passerine is included in the breeding list.

This may be compared with the list presented by Green (1969) in which 88 species have been found breeding on Flinders Island and about 151 species of birds have been recorded from the Furneaux Group.

It would seem that the island has suffered a reduction of scrub since its first contact with white man (cf. Backhouse, 1843 with Norman, 1966). Certainly the native portion of the flora has declined as the island has been cleared and stocked. The decrease of the endemic flora has not benefited native species of birds, excepting possibly the Cape Barren Goose. The increase in alien plant species on the other hand has certainly benefited exotics such as the Skylark and Blackbird, which have colonised the island. Other alien species use the island as a feeding habitat.

Final consideration of the importance of Green Island in the trans-Bass Strait migration is limited by the lack of knowledge concerning the overall structure of the migration itself. It is also limited by the lack of comparative data which are required before generalisations can be made.

Abstract

Observations of 62 species of birds seen on Big Green Island, Furneaux Group, Tasmania, during the period 1965 to 1968 are presented.

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Death of Mr. A. G. Hooke

Arthur Garnsey Hooke, a Club member since 1920 and its treasurer for 16 years from 1950 to 1966, died on 12 April last. A tribute to Mr. Hooke and his membership and service will appear in a future journal.

A note from Mr. J. Jones is published below. [Ed.]

Appreciation of A. G. Hooke

Garnsey Hooke was a unique man in my experience of many men in natural history, in business, and socially. He was markedly different in his personality of gentlemanliness, objectivity, patience, persistence, diligence, competence and other qualities. Above all he was characterized by gentlemanliness. He was innately courteous, disciplined, scrupulous, never pretentious — a gentleman in true manner.

My closest affinity with him was in bushland matters for The Sir Colin Mackenzie Sanctuary, Healesville; particularly in recent years with investigations towards eventual public access to the bushland through a system of walking tracks with natural-history exposition.

I first met Garnsey in 1956 when as a member of the Sanctuary's committee of management I was assisted by a F.N.C.V. work party, including Garnsey, in establishing a nature trail in the Sanctuary bushland. His interest in the Sanctuary persisted and widened, and in early 1961 he became a committee member. He was active immediately, continually and effectively in Sanctuary affairs, notably in three areas. His professional experience in accounting, auditing and insurance was applied to finance analysis and budgetary control; he gave close attention to details for fauna exhibition and improvement; and his love and knowledge of the bush made him an ever-willing participant in exploration and assessment of the Sanctuary's 380 acres of forest. His service to the Sanctuary was great and I believe irreplaceable in one man. He will be missed, and he will be remembered.

—Jack Jones.

Field Naturalists Club of Victoria

General Meeting

13 April

About one hundred and twenty members and friends were present and Mr. T. Sault, the president, was in the chair.

He announced the death of Mr. Frank Zirkler, and of Mr. A. G. Hooke. Members stood for a minute in silence in respect to their memory.

Mr. Sault said that Mr. Zirkler had been in office in the Botany Group and a conspicuous worker in the Nature Shows. He had been active in contacting new members and making them feel at home.

Mr. Ros Garnet said that Mr. Garnsey Hooke was one of the most active members. When in the A.I.F. in Egypt in 1915, he met a Field Naturalist in his Unit who urged him to join the Club. He became a member when he returned home.

After years in office he was elected an honorary member because he had given so much service to the F.N.C.V. in his position as Treasurer for many years. As an accountant, he had arranged the financing and production of many of the Club's works. He represented the Club on the Natural History Medallion Committee. The Club owes a great debt of

gratitude to him in helping it through difficulties.

Mr. A. J. Swaby also spoke of Mr. Hooke's help in 1956 in the preparation of Nature Trials in the Sir Colin McKenzie Sanctuary. He was an officer on the Committee.

The president reported that Mr. Alan Morrison was recovering from a serious eye operation. The good wishes of members go to him for complete recovery.

Miss Florence Smith, a long standing member, who worked with Miss Jean Galbraith, is ill in the Hedley Sutton Hospital behind St. Mark's in Canterbury Road, Canterbury. Some members may be able to go and see her.

Mr. D. McInnes announced that the Council will invest $1500 in publishing Mr. J. Ros Garnet's book on the plants of Wilson's Promontory.

The subject for the evening was "From Gibbers to Greenery" (Birdwatching across Northern New South Wales and Southern Queensland) by Miss Helen Aston.

Six ladies in two ordinary cars travelled two and a half thousand miles from 13 September to 4 October, 1969. They carried 22 gallons of water, food, numerous spare parts, petrol and camping gear. Running repairs were executed on the spot with the aid of nail files, a singlet and tape.

A map showed the route through Mildura to Broken Hill, Milparinka, Tibooburra Teurika Homestead, the Bulloo River overflow, east to Wanaaring on the Paroo, up through Hungerford gate in the border fence to Cunnanulla in Queensland, back through Hebel to N.S.W., Lightning Ridge, Walgett and to the Warrumbungles.

Colour slides taken by the party showed contrasting habitats. Many of the birds seen were shown in slides from Bird Observers' Collections. Wedgebills and the Red-backed Kingfisher were seen near Broken Hill. North from there pictures showed gibber country and Sandy Creek crossings, dry except in rainy seasons. These had red gums with Major Mitchell cockatoos and Mulga parrots. Near Packsaddle were Cassias, acacias and casuarinas. *Acacia ligulata* bushes showed guttering due to wind blowing around. A brown cuckoo shrike was amongst the birds seen. The introduced *Nicotiana glauca* attracted Yellow Throated Miners and other honey eaters. Also seen were Black-faced Wood Swallows, Blue Bonnet Parrots and Crested Bronzewings. The bar of Packsaddle race course was made from cane grass *Eragrostis Australasica* Milparinka showed one composite functional building and ruins of the gold mining town. In 1845 Sturt stayed for six months, his scouts trying unsuccessfully to find other water. Poole died from scurvy.

To the north Tibooburra, encircled by low ridges with big boulders, is a fair town with amenities. The gibber bird —a recently described new Australian species was here. Three nights were spent in the woolshed at the Teurika Homestead of Mr. and Mrs. Whitehair.

Near the Adelaide gate in the border fence there was low salt bush with Orange Chats and Emu. Water channels had azolla on them and a Pratincole was seen. Cane grass stretched for miles —a very useful thatching and building material for early settlers who used it with mud for walls. The Bulloo River overflow is an extensive area and here were seen Red-Kneed Dotterel, and the Grey Grass Wren first recorded by Mr. N. Favaloro a few years ago. Beyond the Cane grass, *Atriplex nummularia* (old man salt bush) had Blue-Winged Parrots in numbers feeding on it.

Extensive wind blow outs, in places covering fences, exposed aboriginal implements, and two big grinding stones with grooves in which smaller stones were rubbed were discovered. Over the gibbers to the Mulga they encountered salt pans, a bearded dragon being seen on the way. Crimson Chats were in the Mulga.

Near the Paroo River at Wanaaring were flocks of White-browed and Masked Wood Swallows.

Shiny leaved Bimble Box trees were in the black soil and Mudlark, Wood Duck and wild pigs were seen. One picture showed a cluster of Fairy Martins on a dead tree in the water. Ringneck Parrots, Cockatiel, Grey Teal, White-breasted Wood Swallows were seen. Lignum and Box edged the Paroo. Through the Hungerford gate on the border fence into Queensland en route to Cunnanulla there were acacias cassias and everlastings.

Double-barred Finches, Black-backed Wren, Chestnut-breasted Quail Thrush, and Hall's Babbler (recently described as a new Australian species) were seen,

and leaving Cunnanulla, Black-chinned Honeyeaters, Orioles, Little Wood Swallows, Pale Headed Rosellas, Banded Plover and Pied Butcher-bird were recorded with White Cockatoos back near the border.

Lightning Ridge in N.S.W. showed "Opals *iv* Sale". With its vegetation, it is more attractive than other opal towns.

Red-winged Parrots, Western Warbler and an Oriole mimicking the Spotted Bower bird were in this vicinity.

A Spotted Bower bird's bower had three sections, a central inner one, a front, and a back. The centre had roofing nails and wind screen pieces, the back had vertebrae of animals, and the front had white chalk.

Across the Darling River was the Pilaga scrub—a forest reserve with Murray pines. Pictures showed *Helipterum floribundum* and acres of Carpobrotus. Birds included the Striped Honey-eater.

Pictures of the Warrumbungles National Park showed grand high tops and spires (remains of an old volcano), Bluff Mountain and Mt. Exmouth, just under 4000 ft. The Bread Knife is a very thin long projection. The Park has tracks and markers on trees.

Muelenbeckia with reddish leaves, Hardenbergia and Bursaria with anthorrhoea (grass trees) on the dry slopes were shown. The Turquoise Parrot, Crimson Chats and Apostle birds were here.

The President thanked Miss Aston for the interesting talk and members showed their appreciation in enthusiastic applause.

Mr. I. Morrison projected the slides.

Exhibits

Mr. I. Cameron brought copper minerals: Malachite (Congo) and Cuprite, chalcocite and azurite from north-west Queensland.

Mrs. North—Smoky Quartz (Gladstone, North-East Tasmania). Opalized wood (Campbell Town, Central Tasmania).

Mrs. Swaby—a collection of fungi—*Fomes rimosus, Schizophyllum commune, Phliota spectabilis, Ramaria ochraceo, salmonicolor, Polystictus zonatis, P. versicolor, Trametes cinnabarina,* and a lichen, *Usnea florida.*

Mr. I. Morrison—Larva, pupa and adult Wanderer butterfly (female), *Danaus plexippus.*

Miss I. Dixon—male Wanderer butterfly and common drown (*Heteromorpha merope.*

Mr. P. Curlis—self-sown fern—unknown parentage.

Mr. T. Sault—Rhinoceros bettle.

Mrs. McInnes—large shell *(Campanile symbolicum)* from Albany area, Western Australia.

Mr. Gary Wallace—fossil wood (Flinders Island).

Mr. Ken Strong showed under the binocular microscopes male and female

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fig wasps and the head of a female fig wasp from a Moreton Bay fig.

Fifteen new members whose names appear in the April Naturalist were elected.

Mr. Baines reported that the "Australian" newspaper had articles on aboriginal art, pointing out the antiquity of the works probably before the current race of aborigines.

Dr. Wanliss announced a Fauna Conservation meeting on 22 April with pictures of North-West Australia.

Mr. Swaby said that he would have plants of *Pratia surrepens* to give to anyone who wanted them.

Mr. W. Woollard requested action on the public address system which was not functioning. Mr. A. J. Swaby supported the request.

Botany Group Meetings

12 March

There were 22 members and visitors at the March Botany Group meeting. The subject for the evening was a talk by Mr. Jim Willis, "Botanical Personalities in Australia". The opening remarks dealt with the value of plant specimens for herbarium purposes. There is little value till the name is added. The locality (including habitat) is very important and the date and month of flowering is useful. The name of the collector is less important than that of the determinant. When both are the same this adds to the value. For example the Melbourne Herbarium has implicit trust in the accuracy of such a collector and determinant as Mr. Cliff Beauglehole. The handwriting and background of travel and experience can be useful.

The speaker said he was not going to deal with such well-known names as Brown, von Mueller, Gunn, etc., but with minor botanists who lived and worked (and usually died) in Australia. Of these the "lady-collectors" predominated. From Western Australia there was **Miss Sarah Brooks,** who arrived in Esperance as a child of four in 1874 and collected in the lonely Mt. Baggett area north of Israelite Bay. Her name is honoured in *Scaevola brooksiana.* She wrote to von Mueller for over thirty years. The second was **Miss Annie Cronin,** now Mrs. Walker, a matriarch of 99 years and still alive. The third selection was **Mr. Charles Austin Gardner,** born 1896, who died very recently. He came to Western Australia in his twenties and was first a collector for the Forestry Department, then botanist to the Agricultural Department and finally Government Botanist in Western Australia. By 1965 he had discovered seven new genera, 125 new plants and had a pile of 200 awaiting description.

From South Australia, the chosen botonists were **Johann Otto Tepper,** who was a teacher in the Education Department for many years and finally became Government Entomologist. Also from South Australia was the **Rev. Hermann Kemp,** who went to Central Australia in 1875 with the first expedition of Lutheran Missionaries.

The Victorian collectors mentioned were first another German, **Johann Paul Eckert,** who was a musician and artist, leaving a collection of beautiful coloured prints of grasses. He collected in the Wimmera and Glenelg River area (1890's). The second botanist was **F. M. Rieder,** an aristocrat who ended sadly. He was a foundation member of the F.N.C.V. and studied the flora of Studley Park and later the Wimmera, including studies of flowering plants (especially grasses), mosses, liverworts and fungi. One of the "lady-botanists" was Mrs. Annie McCann (nee MacDonald) who lived at Granite Flat, Mitta Mitta, ran the hotel, P.O. and store wrote flamboyant poems and letters and collected botanical specimens. **James Stirling** was a geologist in Victoria's north-east and lived at Omeo. He was a member of the Royal Societies of Victoria and of London and was responsible for the opening of the black coal deposits in the Wonthaggi area and reported the Gippsland Brown coal. He wrote on the Phanerogamia of the Mitta Mitta source. *Helichrysum stirlingii* was named after him.

Joseph Milligan, 1807-1884, from whom we get the genus *Milligania* (*Liliaceae*) and *Helichrysum milliganii,* belonged to the Van Diemen's Land Co. in Tasmania, was Superintendent of convict discipline, protector of aborigines and was responsible for sending them to Flinders Island. **Raleigh Black** was an expert Tasmanian botanist, though he left school at 3rd or 4th grade. After various vicissitudes he ended up in the Pivot Phosphate Co. in North-East Victoria where Mr. Willis tarvelled with him in 1938, finding him versatile in conversation and an amiable companion.

From New South Wales we have **William Lockhart Morton,** 1824-1898,

a foundation member of the Royal Society, from which he resigned as a gesture of protest against the Burke & Wills Expedition. He travelled and botanised in arid conditions in the Mallee and on up to the Mackay district in Queensland. Another from N.S.W. was **Wilhelm Bauerelan** who was official collector for the N.S.W. Museum of Technology and collected thousands of specimens.

In Queensland, the two botanists mentioned were **Karl Heinrich Hartmann,** a nurseryman from Toowoomba, a prolific collector, who collected the type specimen of *Sarcochilus hartmannii,* and **Mrs. Harriet Biddulph,** 1839-1940, who at 101 years needed no spectacles and was still a gardener. *Hemigeinia biddulphiana* was named in her honour. She had collected at Mt. Playfair where she lived in Central Queensland.

The bare bones of facts about these botanists were clothed with racy little anecdotes of their occupations, lives and characters, so that the expectant audience of the Botany Group was not disappointed by Mr. Willis' instructive and highly entertaining talk.

9 April

There were 19 members present with Mr. Fairhall as chairman. He reported the death of Mr. Frank Zirkler, who had been an active and keen member of the group, always ready to offer his help when there was work to do and to give a friendly welcome to newcomers. It was decided that the Botany Group should give a book to the library in memory of Mr. Zirkler.

Various business matters were dealt with and a proposed week-end excursion to Wilson's Promontory from 6th to 8th November was confirmed.

The subject for the evening was "The Family Myrtaceae" presented by Miss M. Lester. After stating the importance of Myrtaceae to Australia and a brief answer to the question "What is a Family?", Miss Lester showed slides of familiar Victorian genera. The family characteristics of the flower, fruit, leaves and habit of growth were examined in turn with each main genus. The differences between the genera Eucalyptus and Angophora and between Melaleuca, Callistemon and Kunzea were explained with slides that clearly demonstrated those differences. The genera Leptospermum and Baeckea, and the genera Thryptomene and Micromyrtus were similarly treated. Lilly-pilly was shown as the only Victorian species with a berry instead of the more usual Australian fruit of woody capsules in Eucalyptus, tea-trees, etc., or the small nut of Thryptomene and Calytrix. Miss Lester concluded her talk by showing slides of two unusual flower forms from Western Australia, a species from tropical South America—the other country that is very rich in Myrtaceae and, finally, *Myrtus communis* from the Mediterranean region. Myrtus is the genus from which the family name is derived.

The chairman thanked Miss Lester for her clear, interesting and informative talk and beautiful slides.

Geology Group

4 March

Fifteen members attended with Mr. Davidson occupying the Chair. The meeting took the form of a members' night. The short talk on Lateritic deposits by Mr. Kerry Hammond aroused much interest. He gave the requirements necessary for the formations of Bauxite, Iron and Nickel under conditions. They are as follows—

A flat topography, a 75° temperature average, a high average rain fall with a high absorption rate, and a fluctuating water table. The other requirements are—host rocks for Bauxite; an aluminium rich claystone: for Iron; an iron rich Jaspellite: and for Nickel; a Gabbro-Norite rock. The water table should fluctuate about 25 ft. between wet and dry seasons. This continues to dissolve and redeposit the material from the host rock. The Geological structure must be such that it contains the enriched material within closed limits. The Bauxite deposits at Weipa are an example of lateritic deposition. Mr. Hammond said these deposits took a granular form, often termed Pisolitic. He said also that the deposits at Weipa were initiated in late Cretaceous times and were still continuing.

Mr. Davidson gave an account of visits to Queensland and Tasmania and spoke of specimens collected.

These included — Opalized Wood; Rockhampton, Qld. Variegated Rhyolite; Rockhampton. Hyalite (Colourless Opal); Qld. Crocoite: Dundas, Tas. Serpentine, Stichtite, Chrysotile; Rosebury, Tas.

Mr. D. McInnis showed a rock section under polarized light of the mineral Actinolite.

Marine Biology And Entomology Group

2 February

The meeting was Chaired by Mr. R. Condron, 20 members being in attendance.

An apology was received from Miss Jenny Forse.

It was announced that Dr. Brian Smith would lead the F.N.C.V. Marine Biology excursion to Sorrento on Sunday, 5th February.

The Secretary announced that, as yet, he had been unable to obtain a speaker for the March meeting. Mr. H. B. Wilson, Senior Entomologist, Burnley Horticultural Gardens, will be the speaker at the April meeting, his subject as yet to be decided.

The Chairman thanked Dr. Brian Smith for giving the Group Secretary early notice of the availability of a room at the Museum for Group meetings.

Exhibits

Mr. J. Strong—a small black spider with white spots on its abdomen taken at Pt. Addis.

Mr. R. Condron—larvae of the Wood White butterfly (*Delius aganippe*) which he had obtained from Tallarook.

Mrs. Z. Lee—some unidentified species of spiders.

Mr. D. McInnes showed a species of Ant Lion and a species of Robber Fly. Also a protozoan under his microscope (species: *Pixicola*), and gave a short talk on it.

Mr. K. Strong—some beach sand shown microscopically under polarized light.

Miss L. White—a species of tick taken from a lizard.

Mr. D. Long—some small species of snails collected on the F.N.C.V. outing to Cumberland Falls; and also microscopic snails from Tonimbuk.

Dr. B. Smith—a marine bivalve from South Australia, a new species, as yet not described. This is one of the "Watering Pot" shells from near Port Lincoln. Dr. Smith said that up to date there were nine species in this family, most being dredged from 6-8 fathoms.

Mr. J. Selfard—a series of colour transparencies showing the sequence of the emergence of a cicada.

Dr. Brian Smith then projected a series of slides on plankton and explained how a method of cultivation of same was being undertaken in England and he described the method of breeding in a laboratory. Dr. Smith also showed some very interesting colour transparencies taken from plates of old books on Concology. Many slides of *Coelenterata* (jelly-fish) were shown, and Dr. Smith gave a short talk on the habits of them. He also gave a short and very interesting talk on salps.

At the conclusion of this talk, Dr. Smith was thanked by Mr. J. Strong.

2 March

Mr. R. Condron took the Chair, 22 members being in attendance.

The Secretary conveyed the sympathy of the Group to Mr. & Mrs. Long on their recent bereavement.

Mr. McInnes spoke on the Club outing to Sorrento on 15th February which was led by Dr. Brian Smith, who spoke on the various marine specimens collected.

Dr. Brian Smith gave a short talk on the effects of D.D.T. on marine life.

Exhibits

Mr. J. Strong—two species of Nudibranchs (*Ceratosoma brevicaudata* and *Doriopsilla carneola*) which were collected on an excursion to Ricketts Pt. by the Hawthorn juniors led by Mr. D. McInnes. Also two species of Chitous (*Ischnoradsia australis* and *Poneroplax albida*) also from Ricketts Pt. The anterior valve of the latter species has the insertion plate teeth commonly known as "Mermaids' Teeth".

Mrs. Z. Lee gave a short talk on a Nudibranch which she had observed in the act of laying eggs.

Mr. R. Condron—two scarab beetles from Rushworth; also a species of dragon fly and saw fly.

Mrs. Z. Lee—a marine worm for identification taken at Sorrento.

Miss L. White—a species of bug.

Mr. K. Strong—silverfish scales under microscopic power.

Mr. D. McInnes—Amellid worms of different species. He gave a short talk on these, and described the feeding habits of one species—also an egg mass, possibly of a species of Sea Hare, taken at Sorrento.

Dr. B. Smith showed some colour transparencies of land snails and gave a short talk on them. He also showed some colour transparencies of a dredging trip for the collection of plankton undertaken by the C.S.I.R.O. last October at Morton Bay. Dr. Smith gave a running commentary on the methods of dredging used and the different types of apparatus employed.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

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MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 8 June—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Nature Notes and Exhibits.
3. Subject for the evening—"Tide will Turn": Mr. E. G. Wallis.
4. New Members.

Ordinary:
Mr. J. Morley, 8 Mary Street, Hawthorn, 3122. (Interest—Geology.)
Mr. P. G. Smith, Botany School, University of Melbourne, Parkville, 3052. (Interest—Botany.)
Joint with Mrs. M. Corrick:
Mr. A. C. Corrick, Bank of N.S.W., P.O. Box 66, Moreland, Vic., 3058.
Country:
Miss Heather Maggs, 12 Allen Crescent, Stawell, Vic., 3380.

5. General Business.
6. Correspondence.

July—"A Biological Survey of Victoria": Mr. R. T. M. Pescott.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 11 June—Botany Group. Mr J. Baines will speak on the Botany of Captain Cook's Australian Voyages.

Wednesday, 17 June—Microscopical Group.

Friday, 26 June—Junior meeting at 8 p.m. at Hawthorn Town Hall

Wednesday, 1 July—Geology Group.

Thursday, 2 July—Mammal Survey Group meeting at 8 p.m. in the Arthur Rylah Research Centre for Environmental Studies—corner of Brown Street, and Stradbroke Avenue, Heidelberg.

Friday, 3 July—Junior meeting in Rechabite Hall, 281 High St., Preston at 8 p.m.

Monday, 6 July—Entomology and Marine Biology Group meeting at the National Museum in small room beside the theatrette at 8 p.m.

Thursday, 9 July—Botany Group. Mr P. Kelly will speak on Moulds.

F.N.C.V. EXCURSIONS

Sunday, 14th June—Botany Group Excursion. Meet at Frankston Railway Station at 10.15 a.m. Anyone prepared to offer transport or desiring same please contact Mr H. Kleinecke (25 2415).

Sunday, 21 June—Natural Resources Conservation League Nursery at Springvale and visit to a Nature Reserve. The bus will leave Batman Avenue at 9.30 a.m. fare $1.20. Bring one meal.

Saturday, 29 August — Sunday, 6 September—Wyperfeld National Park and Little Desert camp out. Tentative plan is to travel to Wyperfeld on Saturday, 29 August remaining there until Wednesday, 2 September then going to Broughton's Waterhole in the Little Desert for the remainder of the excursion. Members will be responsible for their own food and camping gear but there will be opportunities of replenishing food supplies during the week. The coach fare will be $18.00 and this should be paid to the excursion secretary by the end of July, all cheques to be made out to Excursion Trust.

Saturday, Sunday 17-18 October—Weekend excursion to Castlemaine details later.

Geology Group Excursions

Sunday, 7 June—Maribyrnong River Terraces. Leader: Mr. Dan McInnes. (Previously advertised for 10 May.)

Sunday, 5 July—To Cave Hill (Lilydale) Limestone Quarry. Leader: Mr. J. Dobson.

Sunday, 9 August—To Heathcote. Leader: Mr. R. Davidson.

Transport is by private car (spare seats are usually available for those without their own transport). Excursions leave from the western end of Flinders Street Station, opposite the C.T.A. Building, at 9.30 a.m.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: E. King

F.N.C.V.

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The enormity of size of the female of the *Nephila* sp., compared with that of the male, is shown clearly in this photograph taken by Graham Pizzey. (See article on p. 159).

Bushfire Frequency and Vegetational Change in South-eastern Australian Forests

By N. A. Wakefield*

Introduction

The article deals primarily with certain forested Crown lands in the northern part of East Gippsland, Victoria. The area concerned is bounded by the Great Dividing Range on the west, the New South Wales border on the north, the Snowy River on the east, and a line approximately from the Little River-Snowy River confluence through Mount Seldom-seen on the south. The tract embraces some 250,000 acres, or a little over 400 square miles.

The elevation at the Snowy River is about 600 feet and at the Cobberas Mountains about 6,000 feet. The topography is complicated, with deep river valleys intersecting areas of mountain ranges and plateaus. Mean annual rainfall is from approximately 20 inches in the Suggan Buggan valley to over 40 inches about the Dividing Range. Due to variations in soil, precipitation, elevation and aspect, there is a mozaic of different vegetational formations. Of those in the tract which has been defined, the following will be commented upon in this article:

(a) *Peppermint Forests.* These occur mainly in the valleys of the Buchan River and its tributary the Reedy River. (The latter is called "Reedy Creek" on some maps.) They occupy more-or-less steep stony slopes on the warmer aspects, and the dominant trees are Broad-leaved Peppermint (*Eucalyptus dives*) and Brittle Gum (*E. mannifera*). In some places there is, in addition, some White Sallee (*E. pauciflora*) and/or Candlebark Gum (*E. rubida*). The main grasses are *Danthonia* spp. (e.g. *D. pallida*), *Poa* spp. and *Themeda*, but grass is a minor element in comparison with the great bulk and variety of woody shrubs.

(b) *Gum Forests.* The Wulgulmerang Plateau, at about 3,000 to 4,000 feet elevation, and neighbouring areas, carries mixtures of White Sallee (*Eucalyptus pauciflora*), Candlebark Gum (*E. rubida*) and Mountain Gum (*E. dalrympleana*). In general there is a medium to thick ground cover of coarse grasses† (*Poa* spp., *Danthonia* spp. etc.), which intermix with sedges in flat wet places. On comparatively dry slopes, especially rocky ridges, there are some patches of shrubbery (*Pultenaea juniperina, Daviesia* spp., *Acacia dealbata* etc.).

(c) *Box Woodlands.* The lower parts of the valleys of the Snowy and Suggan Buggan Rivers, up to approximately 2,500 feet elevation, carry an open woodland of White Box (*Eucalyptus albens*) and fine grasses, mainly *Danthonia* spp., *Poa* spp. and *Stipa* spp.). On some of the northerly and westerly slopes the eucalypts are replaced by cypress-pine (*Callitris columellaris*); and steep more-or-less rocky hillsides carry Red Stringybark (*E. macrorrhyncha*) and coarser grass (mainly *Poa*).

* Monash Teachers' College, Clayton, Victoria.

† Despite the coincidence of genera, the actual species of grasses are generally different in the different forest formations discussed.

History of Cattle Grazing and Burning

Cattle were first pastured in the Suggan Buggan valley in 1843, and from 1845 onward the Wulgulmerang area was used for grazing by members of the O'Rourke family. Soon after the turn of the century, properties at Black mountain and Wulgulmerang were acquired by J. C. Rogers, and he and members of his family have grazed cattle, in the area defined in the above introduction, for the past 68 years. Usually the forest grazing involved about 300 to 500 Hereford cattle.

A general outline of burning practices and their effects on vegetation has been provided by K. C. Rogers, a grazier living in the Black Mountain area, in these terms (letter, 30/8/1969):

My father came to Black Mountain in 1902. In those days John O'Rourke of Wulgulmerang and others used to tell of the open, clean-bottomed, park-like state of the forests of this tableland and adjacent areas, which they could well remember from earlier days. The Pendergasts of Benambra, whose cattle runs adjoined ours at the Dividing Range, told the same story. Over a period of years, before we came to the district, it had been the accepted thing to burn the bush, to provide a new growth of shorter sweet feed for the cattle.

As soon as we boys were old enough, we were keen to do the burning. The practice was to burn the country as often as possible, which would be every three or four years according to conditions. One went burning in the hottest and driest weather in January and February, so that the fire would be as fierce as possible, and thus make a clean burn. As a general practice, in the valleys, we would light along the rivers and creeks, so that the fire would roar up the steep slopes on either side, making a terrific inferno and sweeping all before it. The hotter the fire, the sweeter and better the feed for the cattle after the new growth came. The tablelands received special attention, for the high country, though more tedious to burn, provided the most feed. Should a wet summer occur, the burning programme was all the more important the following year.

In short, the run-holders, until regulations prevented, would consistently burn the bush as often as possible. The only area where this procedure did not apply extensively was the White Box country of the Snowy River and Suggan Buggan valleys, for the grass there was sweet without fire. It would seem that the long-followed practice of regularly burning the bush in the hot part of the year has resulted in a great increase of scrub in all timbered areas except the box country. The latter does not burn readily, even if fired, and the forests of White Box remain clean in the bottom.

That poses another question, regarding the great abundance of the younger group of cypress-pines in the valleys of both rivers, where there are only a scattered few of a much older generation of pines amongst the vast majority of the younger ones. In this case it is hard to credit that fire has been the cause of such an increase in pine population, since they are growing adjacent to, or in association with, the White Box timber. The stands of the younger pines were, to my knowledge, about the same in density and distribution 60 years ago as they are today, but I remember them first as much smaller trees.

During later discussion with Rogers, the following specific details were summarized with regard to vegetational growth after firing:

(a) *Peppermint Forests*

Fire cleared all minor vegetation and, when particularly severe in steep areas, it burned foliage and small branches completely off the trees. Within a few months *Eucalyptus dives* coppiced from the butts and on trunks and limbs. *E. mannifera* developed shoots on trunks and limbs but less at ground level. There was vigorous regrowth of ground vegetation, (mainly from root stocks) comprising shrubs, herbs and an abundance of grass of many species (including some annuals). Seeds of shrubs, especially *Olearia, Cassinia* and *Heli-*

chrysum, germinated, as well as those of most eucalypts. *E. rubida,* when present, germinated very prolifically in areas of fierce fire. After years of firing, *E. dives* formed dense thickets due to its ability to coppice after fire. Almost impenetrable peppermint scrubs have become quite a feature along ridge tops of the steep Buchan River valley.

Grass was most palatable to cattle during the season (spring and summer) following a fire. *Danthonia pallida,* for instance, provided good grazing at first but leaves hardened after 18 months (hence the local name "wire grass").

By 3 years, shrubbery had matured and ceased growth, grass coverage was smothered and reduced in bulk, and the eucalypt scrub was about 7 or 8 feet high. At this stage, the area was reburnt. (Burning was rotated, so that a third or more of the forest was burnt each summer when conditions permitted).

(b) *Gum Forests*

In general, an area would be burned over about every four years, but some parts, for example those adjacent to the Black Mountain properties, were generally burned at 3-yearly intervals. Fires were usually not fierce, but occasional fierce bursts occurred, especially on the rougher terrain. Grass was burned back, shrubs and eucalypt scrub killed to ground level, and wattle scrub often killed completely. By the following spring there was regrowth of grass and shrubbery from the rootstocks, eucalypts had coppiced, and seedlings of eucalypts and wattles had appeared. Eucalypt germination, especially of *E. rubida,* produced dense crops in areas of fierce burns. In some areas *Acacia dealbata* formed dense scrubs after fires.

Grass remained palatable and continued to grow through the second spring-summer season also, but after two years showed little or no further increase in bulk. The *pauciflora-rubida-dalrympleana* association was, and still is, on the average, much more grassy and less scrubby than the *dives-mannifera* association.

The escarpment which faces southerly on the northern side of the Reedy River valley provides a conspicuous example of the development of scrublands as a result of firing. Originally there was a well-grassed clean-bottomed forest, mainly of *Eucalyptus dalrympleana* but with some *E. rubida.* It is now an area of dense scrub.

(c) *Box Woodlands*

In general, the country is not susceptible to fire. Lightning fires seldom travel far, except in steep country. During the past 60 years, no fire has burned down into the more open and level parts of the Suggan Buggan valley, not even the fiercest ones that have swept the surrounding forests.

No attempts were made to fire the open Box Woodlands, but some burning was done on the rougher slopes of *Eucalyptus macrorrhyncha,* on adjacent steep slopes of *E. albens,* in rough creek heads, etc. Such burning generally resulted in marked development of scrub (*Eucalyptus, Helichrysum conditum, Cassinia* spp. etc.), and any further burning that was done tended to increase this shrubbery.

Feral and Native Mammals

Rabbits

In the latter part of last century, the O'Rourkes used to run several hundred head of cattle, mainly in the Box Woodland areas of the Suggan Buggan and Snowy River valleys. Rabbits appeared in the country about

the turn of the century and quickly reached plague proportions. Hares were numerous up to that time but then disappeared within a few years to the level of extreme rarity. The development of scrub had progressed in the forests (as distinct from the Box Woodlands) before the rabbit came, but not to the extent that it has during the present century.

Rabbits did not become abundant enough in the forest areas to have significant effects on the vegetation, but in the Box Woodlands they became very numerous and more-or-less denuded the ground of herbage. The stock-carrying capacity of the woodlands was decreased to about one-tenth its earlier level.

In 1948, the writer noted that, although numerous tiny seedlings of *Callitris* could be found in the Suggan Buggan area, there were no specimens whatever between that stage and the small trees estimated at about 50 years of age. Since the advent of myxomatosis, in 1952, and the resultant reduction of the rabbit population, there has been a significant survival of *Callitris* seedlings and many of the young plants are now some feet in height. The conclusion is that *Callitris* germinates freely without fire but that subsequent survival and growth is contingent upon lightness or absence of grazing. According to ring counts and measurements of girth, the scattered specimens of old *Callitris* trees range in age from about 100 to 250 years.

Following reduction of the rabbit population, grass growth has increased again in the Box Woodlands.

Wild Horses

These have usually been present in some hundreds in the area under discussion. They are highly mobile and more nomadic than cattle, and move in force on to recently burned areas, to eat the new grass growth. They crop the herbage closer than cattle do, and thus can feed on shorter and sweeter grass, such as much of that on the subalpine meadows. In summer they concentrate on the snow grass on the high mountains, whereas cattle usually graze there only after it has been burned, and that is very rarely.

Kangaroos and Wallabies

The Grey Kangaroo (*Macropus giganteus*) is scattered but uncommon in the *dives-mannifera* association; it is more numerous on the plateaus in the Gum Forests. Originally, kangaroos were rare on the higher plateaus but are now not uncommon at 4,000 feet and higher. They are plentiful on the fringes of cleared paddocks, which they enter at night to graze on the improved pastures. In the Box Woodlands their numbers have varied in inverse proportion to those of the rabbit populations.

The Brush Wallaby (*Macropus rufogriseus*) appears to be more numerous now than it was originally. It favours drier slopes of the *dives-mannifera* association (living in eucalypt and *Daviesia* thickets) and the more scrubby Gum Forests of the lower plateau country.

Discussion

The writer, while living and working in various East Gippsland localities from the 1920s to the early 1950s, has been acquainted with the practices of graziers in the region and has made both general and particular observations of the vegetation. The history of very frequent firing of forest areas and the change from comparatively open formations to more scrubby vegetation, as described by Rogers, has applied in general to the dry sclerophyll forests throughout

East Gippsland. Various other species of eucalypts have been involved, but patterns have been similar. There is evidence also that development of scrubby forests in south-eastern New South Wales and in other parts of Victoria has been associated with high frequency of bushfires.

Graziers' fire practices in New South Wales, over 140 years ago, are described by P. Cunningham (*Two Years in New South Wales,* vol. 1, pp. 211-2; 1827):

> The old withered grasses are usually burnt off in the spring, and often at other periods of the year if you have an extensive run for your stock; and it is astonishing to see how quickly and how luxuriantly the new grass will push up after these burnings, if a shower of rain should happen to follow them. When judiciously accomplished, they certainly produce most beneficial effects, by destroying all the old grass which the cattle and sheep refuse to eat, and which is therefore only a bar to their feeding.

The last sentence of the quote conforms to the parts of Rogers' data which note that in the forest areas over-mature grass is not readily eaten by stock. In this connection it is relevant that virtually all the more open forests in south-eastern Australia were included in the runs leased to the original squatters, and that, subsequent to that era, most of the forests were again leased more-or-less continuously to graziers. Consistent rotational burning was necessary in these grazing leases to keep them functional from the graziers' point of view.

There has been much consideration recently, by foresters and other interested persons, of the problem of fuel accumulation in southern Australian forests, and of the question of the use of mild burning, in suitable weather conditions, to reduce this fuel and thus minimize the risk of very destructive wild fires in the forests concerned. When endeavouring to establish an historical background to the problem, authors of addresses and documents on the subject usually advance the hypothesis that the widespread change from open grassy forests to dense scrubby formations has been due to *infrequency* of fires during the era of European settlement in Australia, as compared with the (postulated) high frequency of aboriginal fires. As far as sclerophyll forests are concerned, such histories as that given by Rogers indicate that this hypothesis is the opposite of actual fact.

As regards East Gippsland, and evidently elsewhere in south-eastern Australia, the salient points are (i) that for about a hundred years there was a regime of rotational burning, at 3-4 year intervals, of many or most areas of dry sclerophyll forest, and (ii) that during this regime there was marked increase in shrubby undergrowth in these forests. It is significant that such evolution of scrub occurred in areas subjected to maximum possible fire frequency. This appears to demonstrate, conclusively, that the more grassy and less scrubby forests known to the earliest settlers were *not* a deflected climax due to high fire frequency but were, on the contrary, a state of vegetation associated with comparatively low fire frequency.

It should be noted that these comments are applied to dry sclerophyll forest formations, not to woodlands or wet sclerophyll forests. The main areas of Box Woodlands of north-eastern Gippsland have not had a known fire history nor have they been involved in the problem of accumulation of scrub and other dangerous fuels. The wet sclerophyll forests of Victoria, notably those dominated by *Eucalyptus regnans,* have

had quite different histories — in this case involving comparatively infrequent but very devastating fires.

It should be noted also that, in general, the regime of high fire frequency in the dry sclerophyll forests of Victoria terminated some 20 years or more ago, with the introduction of certain legislation, the implementation of stricter fire prevention measures, and the development of more sophisticated access and fire fighting facilities. During the past two decades, over-mature scrub and dead fuel have tended to accumulate, and there have been some very destructive accidental wild fires, such as those which swept the Wulgulmerang area and neighbouring parts in 1952 and 1965. It is this kind of episode which necessitates the consideration of systematic fuel reduction by controlled burning.

The point which this article seeks to emphasise, that the increase of scrubby undergrowth in our dry sclerophyll forests was associated with *high* fire frequency, is of academic rather than practical importance. The forester's practical problem is to determine how to reduce the inflammability of the present scrublands, irrespective of the factors which caused their development. The matter of cause however has bearing on the question of aborigines' use of fire and the frequencies of fires in various formations in Australia in the pre-colonization era. It is proposed to consider these latter aspects in a further article on bushfires in the near future.

Appendix

A draft of the foregoing article was submitted for criticism to certain persons who are actively concerned with problems of forest fires, and those persons made the following suggestions:

(a) That the burning carried out on the Rogers run had *not* in fact been as frequent as stated, that fires burning in 3-year-old fuels would *not* "roar up the steep slopes", etc., and that such effects would have been observed instead in fuels not burned for probably six years or longer.

(b) That, while mild fires at 4-year intervals (and in some places longer) would be likely to change a clear forest floor into a scrubby one, this did not negate the theory that many "clear" forests of the dry sclerophyll types were due to more frequent fires.

(c) That if two, three or even four fires occurred in quick succession on an area, then those shrub species not able to survive by root stock or seed supply would be substantially reduced and it would take many years for them to recolonize the area, regardless of fire frequency after the "quick" fires.

After examination of these criticisms and comments, Rogers replied as follows (letter, 10/11/1969):

> I can only stress the accuracy of the statement that we burned the bush *as often as possible.* Naturally there were seasons when burning could not be done, so that there were instances when certain areas missed out on a burn for six years or more. These naturally were the places that carried the greatest infernos if in steep country, and such fierce fires tended to produce the worst scrub. On the other hand, we burned a lot of the bush every three years.

No bushland in this area would ever burn extensively if fuel were only one or two years old. A vivid example of this was in the great 1939 fire which, after burning Omeo, raced on eastward on Black Friday as far as the high exposed ridge known as Fish Creek Top. There the fire was intense and the branches were burned off the trees, whilst in the Fish Creek valley, immediately below and on the east side, we later observed that burning air-borne debris had started numerous small spot fires which had then gone out. We had burned out that valley and most of the area eastward to this property two years previously, thus saving our home area from the blaze despite the terrible conditions that day.

At three years, if conditions favoured in January and February, fire would sweep over certain areas such as the Buchan River valley at quite a pace, owing to the quantity of dry grass with the scrub. We would also burn a lot of the tableland area, of 3000 to 3500 feet elevation, which surrounds our property, every third year, though this gum forest country is less burnable than the peppermint slopes. Indeed, one summer a number of years ago, during a heat wave, the whole of the tableland along and southward of the Rocky Range, and embracing the heads of Omeo Creek, carried a spectacular fire several miles in extent and severe enough to kill the forest of *E. dalrympleana* and *E. pauciflora*. I can vouch for the fact that the same area was all burned three years previously. However, the top shade temperature that day was 98°, which is quite exceptional for this altitude, and there was a high north-westerly wind with it.

It will be seen from the above details that we indeed carried out "saturation burning", if that term means burning as frequently as possible. It is also evident to me, from results observed, that burning every three years still produces scrub. Most young eucalypt seedlings sprout from the stock when the top is killed by fire. There is also an inexhaustible supply of seed in the ground, which is helped by fire to germinate from burn to burn. This seems to apply to nearly all native plants. That is why scrub now infests the forest floor throughout the tablelands and gorges.

The criticisms and Rogers' further comments, which comprise the foregoing part of this appendix, appear to confirm the earlier contention that, in general, a regime of maximum fire frequency was maintained in the forests in question and that this regime progressively increased the scrubbiness of the forests. This leaves unchanged the conclusion that fires due to lightning and aborigines were collectively less frequent than those during the era of colonization.

As regards the hypothesis that scrub may be eliminated by very frequent fires, it should be noted that *Cassinia, Helichrysum* and *Olearia* species flower and produce their first crop of seeds from 24 to 30 months after germination, and that large shrubby fireweeds (*Senecio* spp.) seed at 12 to 18 months. Therefore, if fires are to eliminate these species by preventing them from seeding, the habitats would need to be burned regularly at 2-year intervals in the case of the first group, and annually in the case of *Senecio*. A regular 2-year fire frequency is certainly not possible in East Gippsland forests and is probably not possible in any of our dry sclerophyll forests.

Rogers' inference that the supply of seeds in the ground does not become exhausted despite a series of germinations, is evidently quite valid. In various parts of Victoria it has been noted that areas which have been bare of shrubs for decades, because sheep and rabbits have eaten all seedlings which have been growing over the years, will produce a cover of native shrubbery when those grazing animals are excluded.

A Spider and Its Mate

A ROADSIDE ENCOUNTER

by MADGE LESTER

In March 1969, en route to Seymour via the Hume highway, I stopped for a leg-stretch somewhere the other side of the "Divide". Wandering near the road, I came upon a huge spider in a huge web. The spider was at about head height over a gully-cum-drain, and the web was supported from bushes about 8 feet apart.

Never before had I seen such a big spider: a gross, bloated thing, the abdomen being about 1″ long, but quite an attractive pale grey colour; while the legs were black and white with touches of yellow. Trussed up in the web above the spider was a substantial collection of queer rubbish, presumably the remains of past meals.

I returned to the car for the camera, put it on a tripod and added a ring to the lens with the idea of shooting at about 10″ distance. I was trying to splay the legs of the tripod to get it steady, when the spider suddenly raced across the top of its web. I do not like spiders at any time, and when one the size of a plum becomes very active a few inches from my face, my natural reaction is a sharp withdrawal. Anyway, I could not get the tripod steady so thought I would try round the other side.

By the time I had walked round the bushes the creature had settled down again. But it was even more revolting from this side, for there was a big hole—about the size of a match-head in the body, and this side was not the pleasant grey colour of the back. I was struggling with the tripod when I saw something that prevented all further attempts to spread the tripod legs and thereafter I used them together as a single long pin.

Coming down through the remains of past meals was a little rusty-red thing. It was the size of a large pea and had very long legs.

My total knowledge of spiders was that they make webs, have eight legs, and the male is usually smaller than the female — but I never dreamt there could be so much difference in size as this. But surely nothing but a male of the same species would be so foolhardy as to choose to approach such a monster.

The little rusty-red spider came on hesitantly. Accidentally I shook the web and it raced back. But it did not go far, and again advanced downwards.

Having now arrived at the hole in the monsters body, he poked his "feelers" into it (*palps* is the correct term for those). This took some seconds, but all the time the female was entirely motionless as if in a trance.

After he had completed this act, instead of going back up the way he had come, the silly little thing continued on down forwards. He came on cautiously — advancing, pausing, and retreating, similar to but even more cautious than in its earlier approach to the hind end. He looked just as compulsive.

It seemed to me that there could be only one outcome, and I was torn between not wanting to see it and wanting to see everything possible. I stood rooted, ready to shoot as soon as the female moved. But nothing

happened; whilst the little fellow continued to advance and retreat. Then I realised that I was running late for the appointed lunch, so hastily grabbed everything and dashed off. I therefore do not know the final outcome!

* * * *

These observations made me realise how appallingly ignorant I was, and I began to seek information on spiders. I can thoroughly recommend the book in our FNCV library *The World of Spiders* by W. S. Bristowe. Bristowe is not merely interested in spiders, he has not merely studied them intensely, he *loves* spiders. But Bristowe's spiders are English. We have nothing so loving or so detailed on Australian spiders. Perhaps Stannton's book is a reasonably adequate introduction. The 96 pages he grandly calls *All about spiders.* He has just one page on *Nephila,* so my information of that genus has been gathered elsewhere — from McKeown's *Spider Wonders of Australia* in the library and other sources not in the library.

This large spider is a *Nephila,* a genus that occurs throughout Australia. There are about seven Australian species.

Some Nephila species have been called bird-snaring spiders, but although McKeown gives evidence of small or young birds occasionally being killed by a *Nephila,* the main food consists of large moths, beetles and crickets. Spiders feed on the juices of their prey, and as *Nephila* does not remove her web each morning as some spiders do, she seems to find the web a convenient parking place for the husks of her victims.

Nephila is also called the Golden Web Spider; the main web being pale yellow, sticky and shining, whilst the strut threads and some in the orb too are whitish — differences I failed to observe.

The mating of spiders is certainly peculiar. A few days after its final moult, the male spider builds a tiny web only a few millimetres across on which it secretes some sperm; or, according to the species, the ground, a stick, or a leaf might serve instead of the tiny web. I do not know what *Nephila* does.

The male then transfers the sperm into its palps, and goes seeking a mate. The palps work something like a fountain-pen filler.

The difference in size of male and female is not usually so great as in *Nephila.* The male might be only a little smaller than the female. Nevertheless, mating can be a hazardous business for him and there is usually some sort of courting approach, varying according to the species. With *Nephila,* this seems to be approach cautiously and run back, approach and run back, until the female has wearied of chasing him away and is ready to receive him.

When I first tried to fix the tripod to photograph the back of the female and it suddenly dashed across the top of its web, was it chasing out the male?

That is what I suspect from what I have since read, but I did not see the male until some time after I had moved round to the other side. If only I had known then what I know now I might have observed so much more.

Also, some books speak of *Nephila* hanging in the web during the day with the body down, and two photos show the body down position. When I first saw this one, was she hanging body down or head down as in the accompanying photo*. I do not know; and that is very careless observation. One assumes that the head down is a mating position, but is that position

*See Cover.

taken only when ready for mating; and is thus recognised by the male as comparatively safe?

My sources of information do not make that suggestion and it would seem that more observation is required.

McKeown says that the male *Nephila* usually lands first on the back of the female, and Graham Pizzey has a photo of one there*. But in my observations the male came straight down the front. The male empties its palps into the female body. Bristowe meticulously records whether the two palps are inserted together or one at a time, and whether in one or more actions, as well as the time it takes.

I neglected to observe all these factors. But I can make a guess at the time. There was time enough to wind on the film, swing camera slightly and re-focus, so I assume it was not less than 10 seconds and, from recollection, not more than 60. But that's a pretty wide margin. Graham Pizzey records the process in a *Nephila* he observed as taking about six seconds, and the female grabbing the male as soon as it was over.

But there were many things I neglected to register and I feel very annoyed that a good opportunity was largely wasted. Of course, some of it was due to colossal ignorance — not knowing what to look for or what to expect; but it was mainly due to observation that was far too casual. We need careful, attentive observation — observation that could help to fill in the gaps that still exist in the knowledge of our Australian creatures.

*See Cover.

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The Freame Marine Collection

It may be of some interest to those members who knew the late Mrs. M. E. Freame of Altona, to learn that her collection of marine specimens has been purchased by the Rosebud Aquarium and Museum.

Showcases will shortly be made for its reception. It is expected that it will be on public exhibition later in the year.

The Mitchell River Silt Jetties

by E. C. F. Bird*

The origin of the silt jetties built by the Mitchell River below Bairnsdale (Fig. 1) is still controversial. In 1874, Skene and Smyth suggested that they developed in the manner of a digitate delta, originating when the mouth of the Mitchell opened into Lake King at Bairnsdale, and growing first southwards to Eagle Point, then east-north-eastwards to project into Lake King. This hypothesis was generally accepted (e.g., Gregory, 1903), but in 1949 Clifford wrote an article in the *Victorian Naturalist* suggesting that the silt jetties were produced by partial submergence of a broad flood plain that had been previously built by the Mitchell, with natural levees bordering the river channel, and that below Eagle Point the backswamp depressions flanking these natural levees were submerged to form Jones Bay on the north and Eagle Point Bay to the south. In 1962, after investigating the geomorphology of the Gippsland Lakes, the present author found evidence in favour of the earlier hypothesis of progressive growth of the Mitchell River silt jetties, but this has been questioned by Jenkin (1968) in a memoir published by the Mines Department, and further discussion is now necessary.

In 1962 sand and gravel features were reported along the base of the bluffs west of McLeod's Morass (Fig. 1) and interpreted as shoreline features indicating that Lake King extended to the base of the bordering bluffs prior to the construction of the Mitchell River silt jetties. It was deduced that the Mitchell had built these jetties in such a way as to cut off this western shoreline; the Skene and Smyth hypothesis of progressive growth was therefore preferred to Clifford's hypothesis, which required that natural levees were already present when the last submergence took place.

Jenkin (1968, p. 56) rejects the view that the sand and gravel deposit west of McLeod's Morass is a shoreline feature (i.e., a beach) and describes it as a narrow flat terrace consisting of outwash material from the bordering bluffs. Sand and gravel *downwash* (a term preferred to outwash, which in geomorphological literature is usually applied to material derived from glaciers and ice sheets) has certainly contributed to this slope-foot depositional feature (Fig. 2), but the fact that this feature also extends as a ridge across the mouth of a tributary valley (Fig. 3) and, farther north, projects as a slightly recurved spit, means that some other process has been involved in distributing the downwashed sand and gravel. Jenkin comments that the presence of coarse material (up to cobble size) relative to the available easterly fetch is not consistent with the view that this ridge is a wave-built feature (i.e. a beach ridge), and suggests the possibility of emplacement by river action.

This reasoning cannot be accepted. The available easterly fetch here was at least five miles, and there are several sectors of the present shoreline of Lake King where beach shingle, in-

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cluding cobbles, exists with a much smaller fetch than this: on the north shore of Jones Bay (Fig. 1) for example. The critical factor is the availability on these sectors of the lake shore of coarse material (up to cobble size) for incorporation in beach deposits. This coarse material has come from gravel-capped Tertiary rocks in cliffed sectors of the bordering bluffs. It has certainly not come from the Mitchell River, which carries a load of silt, clay and a little sand, and has built bordering natural levees of this material. The coarse sand and gravel deposits forming the ridge west of McLeod's Morass are similar in texture and composition to existing beaches on the shores of Lake King, and sharply contrasted with the predominantly silty material in the Mitchell River levees, as shown by sedimentological evidence in Fig. 4. The ridge west of McLeod's Morass is therefore not a river levee but a beach formation that extends northwards as a spit which has grown in the opposite direction to the southward flow of the Mitchell River.

As Jenkin remarks, deposition of this sand and gravel material west of McLeod's Morass took place when the water level was at least five feet higher than at present; it is one of several features in the Gippsland Lakes area suggestive of a phase of higher sea level, relative to the land area, during Recent (Holocene) times. Jenkin supports the concept of a mid-Recent sea level 7 to 10 feet above the present, and if this is accepted in local and relative terms (without reference to the controversy over Late Quaternary world-wide sea level

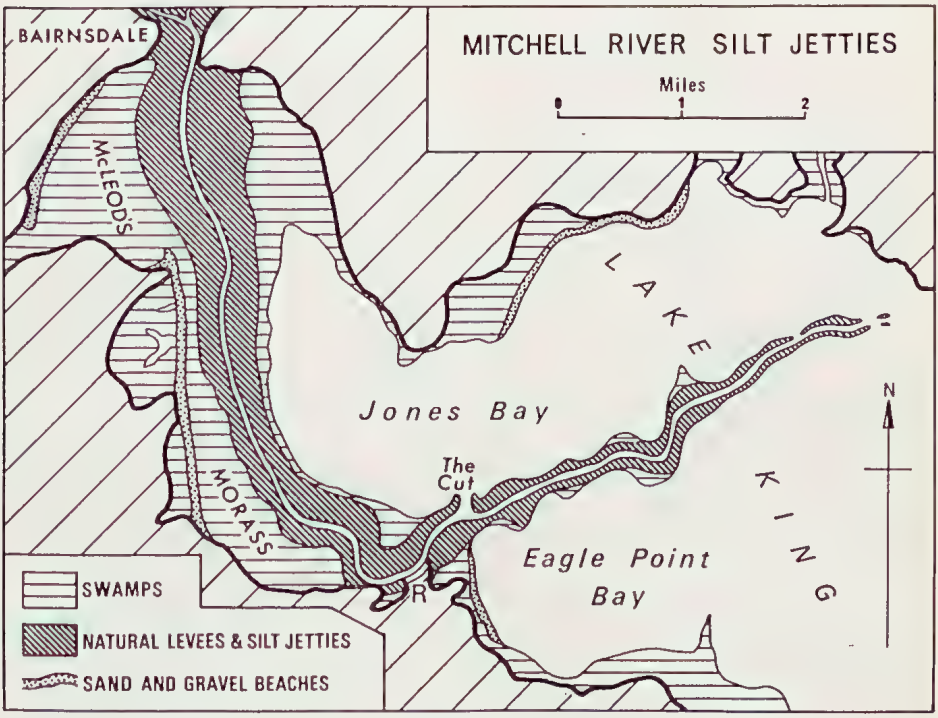

Fig. 1.

Fig. 2. The slope-foot terrace feature west of McLeod's Morass.

fluctuations) the emplacement of the wave-built features west of McLeod's Morass is simply explained. Yet Jenkin then proceeds to revive Clifford's view that the silt jetties are partially submerged natural levees protruding from a drowned flood-plain.

There seems to be a contradiction here. If the last change of level has been one of emergence from a mid-Recent higher sea level, it is difficult to sustain Clifford's hypothesis. The silt jetties do not rise more than 10 feet above present mean lake level,

Fig. 3. The beach ridge (arrowed) west of McLeod's Morass, an extension of the slope-foot terrace feature shown in Fig. 3.

and if they already existed in mid-Recent times they must then have been almost completely submerged. As they are delicate features, being rapidly consumed by wave erosion at the present time, it is unlikely that they could have survived such a submergence. If they had, it would be necessary to consider the present silt jetties as features produced by partial emergence, rather than partial submergence. But it is much more likely that they developed by progressive growth during, and especially since, mid-Recent times.

The difference between the building of natural levees by vertical accretion adjacent to a river channel and the prolongation of silt jetties by forward accretion adjacent to a river mouth is a subtle one. Clearly both processes have been at work, but there is no way of distinguishing them, or deciding which operated first, in terms of sedimentological or stratigraphic evidence; there is little variation, laterally or vertically, within the silt jetties. However, borings in the silt jetties downstream from Eagle Point show that the silt formation is a superficial feature, resting upon a broad and deep expanse of blue clay of estuarine or lacustrine origin. At the Mathieson water-pump, on the northern jetty 250 yards east from The Cut, silt extended to a depth of 6 feet below mean lake level, where it was underlain by 80 feet of dark blue soft clay, resting on gravels, with Tertiary limestone at a depth of 105 feet. The sequence at Letts Bore, farther downstream on the southern jetty, was almost identical*, and the presence of the underlying clay has been confirmed by augering along the lower delta. The clay is similar to lake-floor sediment in Jones Bay and Eagle Point Bay, and is interpreted as material deposited on the lake floor before the silt jetties grew out over it into Lake King. If the silt jetties had originated as natural levees on an aggraded valley

* I am indebted to Mr. M. Hobson of Lakes Entrance for details of these borings.

floor plain they would instead be underlain by a more varied sequence of alluvial deposits. The stratigraphic evidence therefore favours the hypothesis of progressive growth of the Mitchell River silt jetties.

Clifford (1949) indicated two features that he found difficult to reconcile with the hypothesis of progressive growth. He noted that the meanders between the silt jetties are not reflected in the configuration of their outer (lake) shorelines, and he argued that a growing delta, deflected by Eagle Point Bluff, should have taken the direction of the breach cut through the northern arm of the silt jetties immediately downstream by a flood in 1919.

It is likely that initially the river channel between silt jetties growing out into Lake King would have been fairly straight, but there is nothing to prevent the subsequent development of meanders in the delta tract and no reason why such meandering should influence the configuration of the outer shoreline. The Mitchell channel downstream from Eagle Point shows meanders of a type similar to those of the modern digitate delta of the Mississippi, where successive surveys

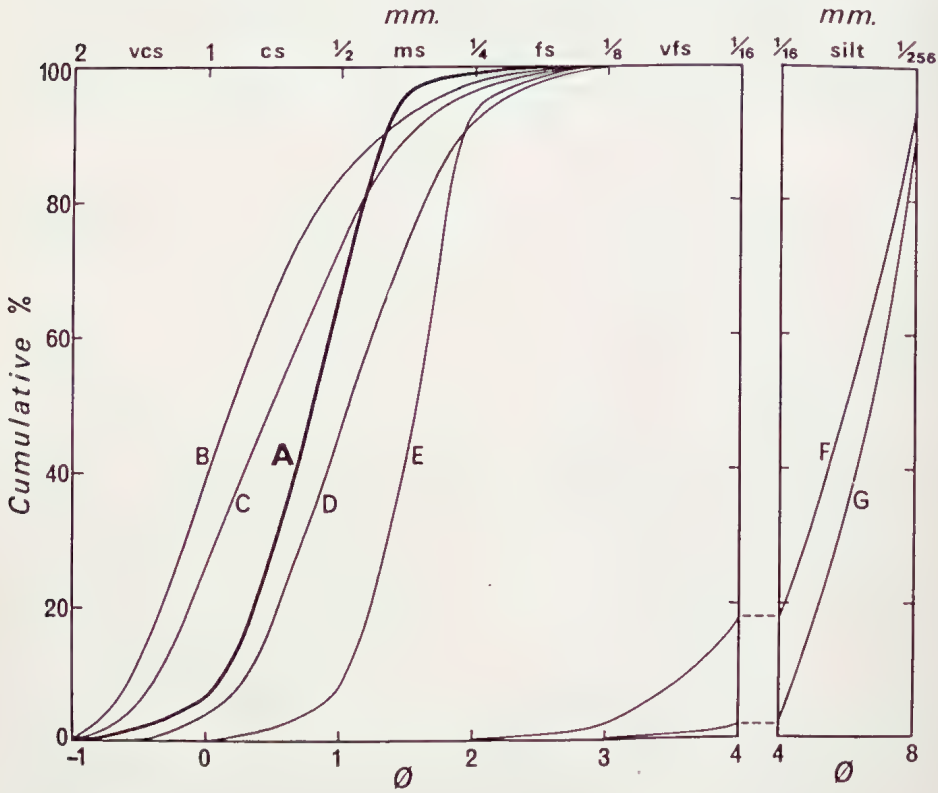

Fig. 4. Grain-size distribution curves of the sand fractions of (A) material from the ridge west of McLeod's Morass and (B-E) beaches from the shores of Lake King. The original samples included the following percentages of material coarser than 2 mm. (granules, pebbles, and cobbles): A—41.5%, B—44.3%, C—28.5%, D—34.0%, E—23.8%. Sediments A-E are contrasted with the much finer material from the natural levees and silt jetties of the Mitchell River (F, G).

show that channel meandering developed in Pass a Loutre and along South-east Pass within the period 1869-1940 (Fisk et al., 1954; Shepard 1955). The Mitchell at Eagle Point has continued to meander over a similar period, undercutting the river cliff (R on Fig. 1) and, a short distance downstream, migrating northward to reduce the width of the northern jetty until it was breached (a process known as crevassing in the Mississippi delta) by a discharging flood (Fig. 5). Meandering since the original formation of the silt jetties has thus prepared the way for a new direction of delta growth, and a small delta has been built at The Cut, projecting into Jones Bay. The features noted by Clifford are thus explicable, and are consistent with the hypothesis of progressive growth of the Mitchell River silt jetties.

At the present time these silt jetties are being destroyed by wave attack on their lake shores, and the conditions under which they formed no longer exist. It has been argued that the growth of long, narrow silt jetties out into Lake King was made possible by the presence of shoreline reedswamp (chiefly *Phragmites communis*), which trapped fluvial sediment and protected the depositional features thus formed (Bird 1961). Lake King has become too brackish, following the cutting of an artificial entrance in 1889, for reedswamp to flourish on its shores, and shoreline erosion has become widespread since the disappearance of this vegetation. If the Gippsland Lakes were returned to their earlier relatively fresh condition it is likely that reedswamp would revive and the process of silt jetty growth would again be demonstrable. Failing this, the process can still be observed thirty miles away in Lake Wellington, where the water is less saline than in Lake King, and

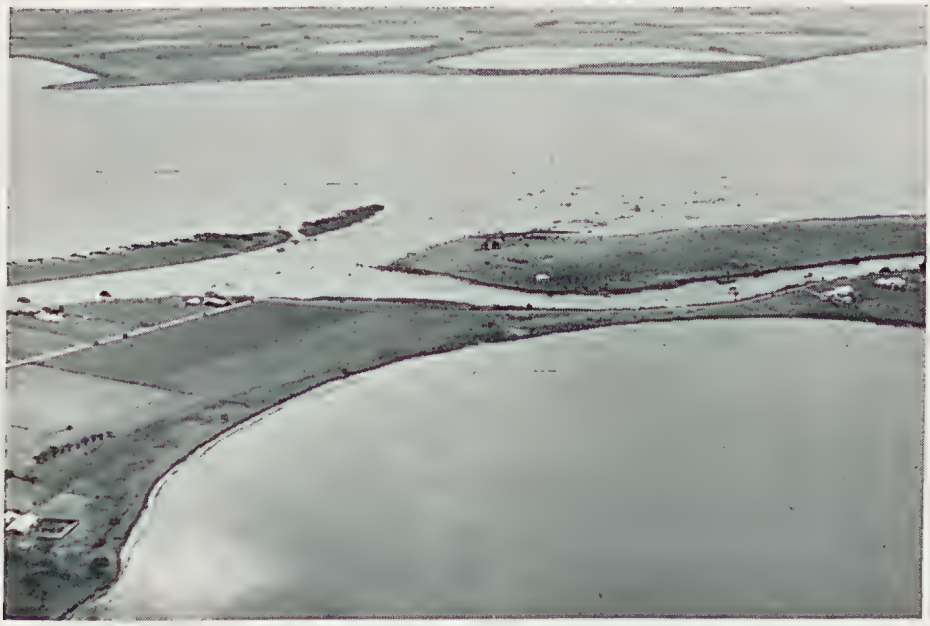

Fig. 5. The Cut, a breach formed in the silt jetty by a discharging flood.

where silt jetties are growing with the aid of bordering reedswamp at the mouth of the Latrobe River.

Acknowledgement: I am grateful to N. Rosengren for help with photographic work and to H. Collier for preparing diagrams.

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A Subalpine Occurrence of the Common Mud-mat

(Glossostigma drummondii)

This minute hairless herb of the family *Scrophulariaceae* creeps and roots on damp mud, forming moss-like carpets. Interest centres in its three large blunt calyx-lobes and especially in the curious stigma which is flattened and almost leaf-like, arching over the four microscopic stamens. *Glossostigma drummondii* occurs through inland areas of all mainland States but has never yet been reported from mountainous terrain along the Great Dividing Range, although it does inhabit the margins of temporary rock pools on the arid hills of Central Australia, e.g. at the summit of Ayers Rock. Victorian records were all from the Mallee or Wimmera (an ephemeral population with flowers on slender stalks exceeding the foliage); so an undoubted collection, albeit with relatively shorter flower-stalks, by Mr. Keith C. Rogers in the region of Forlorn Hope Plain, 27 January, 1970, is quite important ecologically. He found *G. drummondii* growing intermingled with diminutive *Crassula helmsii, Myriophyllum pedunculatum, Oreomyrrhis ciliata* and *Limosella australis* on sods of wet black peaty mud, at about 4,000 ft. altitude — a noteworthy addition to Mr. Rogers's long list of botanical discoveries in East Gippsland. For a general floristic account of this fascinating area, see "Forlorn Hope and Reedy River", by N. A. Wakefield, in *Victorian Naturalist* 77:4-11 (May 1960).

J. H. WILLIS

Plans for a Proposed Census of Non-Marine Molluscs in Victoria

by Brian J. Smith*

and

David C. Land

This short article is intended to let the numerous active field naturalists in Victoria know of the proposal to commence a census of non-marine molluscs of Victoria and enlist the help of any willing person. The object of this census is not only to produce detailed distribution maps of all the non-marine molluscs in the State, but also to carry out taxonomic revisions of these various groups and subsequently to publish a handbook of Victorian non-marine molluscs.

Coupled with these main objectives, other interesting information will emerge from such a survey—

(a) The exact distribution of the introduced snails and slugs (mostly pests).

(b) The present distributions of the Australian native species compared to their known past distributions, as an indicator of the effects of increased land utilization, and other factors.

(c) Distribution of the freshwater snails which act as intermediate hosts in the sheep liver fluke life cycle.

(d) Detailed data of distributions of land and water populations as a basis for future pollution monitoring. This applies particularly to freshwater molluscs.

This survey is being modelled on a similar one being carried out in Great Britain and Ireland by the Conchological Society of Great Britain. One of us (D.C.L.) has practical experience of this survey in Britain and we have been promised help and advice by that Society. For the history of the U.K. survey see Kerney (1967).

*Curator of Invertebrates,
National Museum of Victoria.

Collecting.

It is hoped that as many people as possible will collect and send specimens to the National Museum of Victoria for identification and to allow taxonomic work to be carried out. However it is hoped that local collectors or group co-ordinators can be recruited from the various regions of the State to learn the methods of identification.

Following a recording scheme devised for a botanical survey by workers at Monash University, the State will be divided into 34 squares of side 1 degree of latitude and longitude. These large squares will be divided into the census record squares each of 10 minutes side—equivalent to 11.5 miles by 9.2 miles on the ground. This is a more suitable method of gridding than by using topographical features; for rivers can be dammed, mountains quarried away, and so on, whereas latitude and longitude can always be relocated.

Every part of the State should be visited more than once, and a systematic search made of every habitat. For land snails and slugs, which are usually (especially in daylight) retiring, cryptic animals, always look under objects such as logs, rubbish, or covers of storm-drains—anywhere where it is likely to be dark and damp. Look in gardens, rubbish dumps, deep forest litter, scrub and heath country and coastal dunes. Be especially watchful for the small snails (endodontids) of 1mm diameter. These can be found most easily by collecting a bag of litter or other debris and searching it carefully at home with a magnifier. For aquatic molluscs, look on the

undersides of floating weeds for snails, on the stems and leaves of water plants for freshwater limpets and in the mud at the bottom of streams and rivers for bivalves. A very useful freshwater collecting tool can be improvised by attaching a 6″ diam. gravy strainer to a broom handle.

Preservation and Transport.

As stated above it is initially planned that specimens should be sent to the National Museum of Victoria for identification and recording. For this it is probably best to send the specimens alive. Put the specimens from each locality into a non-crushable container in damp grass or leaf litter, pack this container well into a parcel, mark the parcel SCIENTIFIC SPECIMENS and mail it to—Dr. B. J. Smith, Curator of Invertebrates, National Museum of Victoria, Russell Street, Melbourne 3000.

Freshwater molluscs (snails and mussels) can be sent in the same way. **Do not** send freshwater molluscs in water as they die and rot very quickly. Do not put the locality label in the container with the live snails as they will probably eat it. Do not include green vegetable matter with live specimens. Attach the label to the outside of the inner container or put it inside in a plastic bag or other protective cover. Put in as much field data as possible.

If it is impossible or impracticable to send the material live then it should be narcotized and preserved before sending. Land snails and slugs are narcotized by drowning in freshwater. To assist this break a cigarette into a tumbler full of water and immerse the snails in this mixture for a few hours. Preferably preserve in 5% formalin neutralized with sodium carbonate or baking soda, or in 70% alcohol or methylated spirits. Put freshwater snails into a small container of water and gently stir in a few crystals of Menthol. Leave for a few hours, then preserve as for land snails. Prop the valves of mussels open by inserting matchsticks and then preserve as above. Put a label with the specimens, wrap them in cotton wool moistened with the preservative, seal in plastic bags, pack securely in a parcel and mail.

Helpers and Groups.

If you feel that you can help in this work either as a collector, or (if you live in the Melbourne area) as a data collator and recorder, please contact the National Museum of Victoria.

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* * * *

Arion intermedius Normand, an Introduced Slug in Victoria

by David C. Long

Introduced European slugs have been known from Victoria for a considerable time (early references are given in Gabriel 1930:86), but only members of the family Limacidae have so far been recorded as established. The purpose of this note is to record the presence of *Arion intermedius* Normand of the family Arionidae as an established introduction in Victoria. In the field *Arion* can be distinguished from Limacid slugs by the more anteriorly placed respiratory pore on the right margin of the

mantle shield, the granular nature of the mantle shield (not concentrically ringed as in *Limax* and *Agriolimax*), the wide foot-fringe and the lack of a caudal keel.

A. intermedius is small, "about 2cm when crawling. Its colour varies from yellow to grey with the head darker grey or black and there may or may not be body and mantle bands. All these colour varieties may be found living together. *A. intermedius* is easily distinguished from the young of larger species by the form of the dorsal tubercles which stand up in little conical eminences with translucent tips when the animal contracts (Fig. lb) —hence the popular name Hedgehog Slug. . . . The sole is yellowish-grey and yellow mucus tends to accumulate at each end of it." (Quick 1961:125). In Europe it ranges from Scandinavia to the Azores, Northern Italy and Russia and has been introduced into North America, Polynesia and New Zealand. Longstaff (1912:448) records it from wild bush in New Zealand associated with the introduced snail *Oxychilus cellarius* (Müller).

In Victoria *A. intermedius* has been found in the following localities:—

Beaconsfield and Berwick—340312 (Grid reference using the 10,000 yard traverse Mercator Grid, Zone 7—Australia Series)—5.x.1969. Fairly common under rotting logs and branches in partially cleared pasture (open eucalypt forest with grassy ground layer) near Cardinia Creek.

Badger Creek—357352—30.x.1969. From wet eucalypt forest under fern trees near creek; 4 found in a bag of ground litter examined at home.

Linton Forest (2 miles E. of Linton)— —23.xi.1969. Numerous, under fallen branches on the ground in dry eucalypt forest with a grassy ground layer.

Nr. Cape Patterson—365233—4.i. 1970. About 8 specimens seen in an area about 18″ square, under long decaying grass on the sea cliffs.

San Remo—340249—17.i.1970. Few from rotting grass on the cliff face.

Its cryptic habits here are also typical of the slug in Britain. None of these localities is remote from human influence. At all sites, except Cape Patterson, *A. intermedius* was found with native molluscs, mostly small members of the superfamily Endodontacea which are awaiting full identification. They were found with the native slug *Cystopelta petterdi* Tate at Beaconsfield, Badger Creek and Linton. Introduced molluscs found in association with it were a juvenile limacid slug resembling *Lehmannia marginata* (Müller) at Berwick, and the slugs *Agriolimax reticulatus* (Müller), *Agriolimax* sp. and a limacid slug, both awaiting identification, and the zonitid snail *Oxychilus alliarius* (Müller) at Linton. Specimens of *A. intermedius* from all the above localities have been lodged with the National Museum of Victoria. The specimens

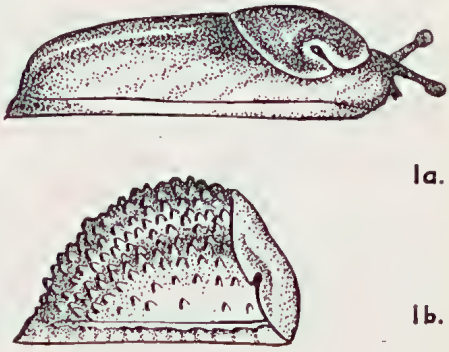

Figure 1. Drawings of *Arion intermedius* (a) crawling and (b) contracted, showing the characteristic conical eminences.

found here show a similar range of colour variation to that seen in Britain.

Cape Patterson and Linton are about 130 miles apart, so that, considering the small amount of search for this slug conducted so far, it seems to cover a fairly wide area of Victoria and is likely to be an introduction of fairly long standing. Earlier workers may have overlooked it on account of its small size and perhaps because it is not obtrusive in gardens as are many of the introduced land molluscs.

Finally, a single juvenile specimen of the genus *Arion* found by a roadside in bushland near Lyonville on 28.ix.1969 appears to be of another species, but for positive identification further material is needed. This specimen is also lodged in the National Museum of Victoria.

Acknowledgements

I would like to thank Mr. R. Miller for doing the drawings and Dr. B. J. Smith of the National Museum of Victoria for reading the manuscript.

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Australian Natural History Medallion Award, 1969

The late C. A. GARDNER, M.B.E.

by D. L. Serventy

It is a melancholy coincidence that what had been intended as a eulogy on the recipient of the 1969 award of the Australian Natural History Medallion should turn out to be also an obituary notice of Western Australia's leading botanist of recent years. When advice of the award reached Perth late last year Mr. C. A. Gardner lay dying of Parkinson's disease in the Home of Peace, Subiaco and he was so incapacitated he could only fitfully recognise his friends. Formal presentation of the Medallion, even at a bedside ceremony, was impossible, but it is satisfactory to record he received the Medallion personally and expressed his keen pleasure at the award. He died on 24 February, 1970.

Charles Austin Gardner was born in Lancaster, Lancs., England, on 6 January, 1896. He was related on his mother's side to the well-known early 19th Century English naturalist, Charles Waterton, of Walton Hall, Yorkshire, who is credited with founding Britain's first nature reserve (see *Animals*, 2 (17), 15 October, 1963; *Country-Side*, 20 (10), Summer 1967).

His family migrated to Western Australia late in 1909 to take up farming at Yorkrakine, near Tammin. He early showed an inclination to botany and art, and studied painting under J. W. Linton, winning a prize for a flower painting at the Perth Royal Show of 1916. He began his career as a clerk with the National Bank but was encouraged in his botanical interests by the late Mrs. Emily Pelloe (authoress of the classic *Wildflowers of Western Australia*, 1921) and Dr. D. A. Herbert. In 1920 he obtained appointment as a botanical collector with the Forests Department, under the Conservator, C. E. Lane-Poole. In the following year he was attached as botanist to the Kimberley Exploration Expedition under Surveyor W. R. Easton. This resulted in his first scientific publication, the substantial "Botanical Notes, Kimberley Division of Western Australia," published in 1923 as Bulletin No. 32 of the Forests Department. In the same year he published the first part of what was to become a lengthy series, "Contributions to the Flora of Western Australia", in the Journal of the Royal Society of Western Australia.

In 1924 he transferred to the botanical banch of the Department of Agriculture, under the Economic Botanist and Plant Pathologist, W. M. Carne. When Carne left to join the CSIRO (or CSIR as it then was) in 1928, this office was divided. Gardner was officially appointed Government Botanist and H. A. Pittman became the Plant Pathologist. The State Herbarium was formally established in that year with Gardner as its first Curator, but, of course, the botanical collections had started accumulating many years earlier. Gardner held this post until 1960, when he reached the statutory retiring age.

The office of Government Botanist was abolished when he retired, and his successor as Curator of the Herbbarium, Mr. R. D. Royce, was styled as Officer-in-Charge of the Botanical Branch within the Biological Services Division, whose Chief was Mr. C. F. H. Jenkins (formerly the Government Entomologist).

In 1937 Gardner was appointed the first Australian liaison officer to the Kew Herbarium in England and on

his return he re-organized the Western Australian Herbarium and began the preparation of a Flora of Western Australia. This had been foreshadowed in his most useful *Enumeratio Plantarum Australiae Occidentalis,* published by the Government Printer in 1930, and still an important reference among local naturalists. Among other offices he held are the following: part-time lecturer at the University of Western Australia; member of the National Parks Board and Hon. Consulting Botanist to the King's Park Board. In the earlier years of the University Botany Department, before the department was adequately staffed, he was frequently one of the leaders in class field trips in the neighbourhood of Perth. In latter years, with the growth in popularity of organized wildflower tours in the State, he was engaged two or three times each year as a botanical guide and lecturer by the W. A. Government Railways on wildflower tours in the Geraldton and Murchison areas. He lectured frequently to various organizations and was a well-known broadcaster in radio sessions.

In connection with his scientific work he travelled widely over the State, and continued field collecting long after his official retirement. He was essentially a taxonomic botanist with ancillary interests in ecology. His publications include a book on the grasses, another on poison plants (jointly with the veterinarian H. W. Bennetts), and before he became ill last year was engaged on two further books—one on the genus *Eucalyptus* and the other on the genus *Banksia.* Popular books include the handsome volume, *Wildflowers of Western Australia,* published by West Australian Newspapers Ltd. in 1959, illustrated by paintings by Edgar Dell and colour photographs by Gardner himself.

His total botanical writings, between 1923 and 1962 have been listed by the Department of Agriculture and cover 18 closely-typed foolscap pages (a copy is held at the Royal Botanic Gardens, Melbourne). He described 8 new genera and some 200 new species of Western Australian plants. Perhaps the most outstanding of these was *Pilostyles hamiltonii,* the first member of the Rafflesiaceae (hitherto known only from the New and Old World tropics) to be recorded from Australia. It is still only known from South-Western Australia where it is parasitic on the genus *Daviesia* (Papilionaceae). A remarkable underground orchid, discovered at Corrigin, Western Australia, in 1928 was named *Rhizanthella gardneri* after him by Dr. R. S. Rogers, of Adelaide.

His botanical explorations in the Kimberley Division in 1921 gave him a life-long interest in phyto-geography, a subject which figured in numerous papers, culminating in his presidential address to the Royal Society of Western Australia in 1942 and his summary article, "The Vegetation of Western Australia", in the collective work, *Biogeography and Ecology in Australia* (The Hague, 1959). Among his ecological papers, one on the relations between the Western Australian flora and fires (published in the *Western Australian Naturalist* in 1958) aroused widespread interest and some controversy but most naturalists are generally satisfied at the soundness of his conclusions.

As a botanist intimately involved in field work he would naturally become very much concerned, virtually obsessed, with problems of conservation. He was unceasing in his advocacy of the creation of large reserves in the various major habitats of the State. Mainly through his own personal efforts he was instrumental in persuading the Government to proclaim the following five extensive flora

reserves: (1) at the lower Murchison River; (2) the Hill River Reserve (Mt. Lesueur); (3) the reserve south of Southern Cross (Lake Cronin); (4) the country between the Gairdner and the Hamersley Rivers (including the wildly picturesque Barren Range), and (5) Cape Arid and Israelite Bay. After his retirement from Government service he felt freer in making forceful comments on conservation issues and on the misuse of lands in the pastoral areas.

He received numerous honours. In 1949 the Royal Society of Western Australia bestowed its Gold Medal on him and in 1961 he was awarded the W. B. Clarke Medal of the Royal Society of N.S.W. He was elected an Honorary Member of the Royal Society of W.A. and of the Western Australian Naturalists' Club (of which he was one of the founders in 1924). In the Queen's birthday honours list of June 1965 he was awarded an M.B.E.

I would like to end with a personal tribute to a close friend of 46 years, in office, laboratory, the bush and in the home. Everyone had an affection for Charles Gardner and at his funeral, when we gathered for the last farewell, some of his numerous colleagues, many of whom had known him for longer than I had, agreed that anecdotes about this lovable character would fill a volume. He had his eccentricities, rather more amiable perhaps than those of his forebear Waterton. There were irritating frustrations due to his lapses as a correspondent. We recalled how we had to wait determinedly at his desk, refusing to leave until he had identified our collections of plant specimens. He accomplished a lot but we wanted more from him. There was such a lot he knew but hadn't put on paper, and which now, alas, has gone to the grave with him. In the field he was a congenial and refreshing companion. Even in his latter years he could outwalk almost all of us. Only an emu could keep up with him, it was said. Like many of his generation he did not own a motor car until well on in life and he was a nervous driver in town, though a Jehu on country roads. However in his pre-car days he was a confident motor-cyclist, riding large expensive machines. I recall in the early 1930's, when I was car-less, being a trusting pillion passenger on his magnificent Brough-Superior.

After hours, in his bachelor home, he was always a delightful host. He tended to compartmentalise his interests and segregate his friends, even his family, accordingly. Thus some visiting botanists might have considered him as only a self-centred botanist, but he really had an unusual variety of cultivated interests. He was keen on astronomy and surveying. He was passionately fond of good music, a devotee of Bach, had a taste for antiques, and was an accomplished painter of trees and bushland scenes. A painting of his, of Yorkrakine Rock, a familiar scene of his boyhood days, hangs in Parliament House, Perth. But almost all his paintings he retained at home; he was very reluctant to give any away and once confided to me that he dreaded holding an exhibition for fear he might be persuaded to part with a canvas or two. I am one of the few friends to whom he gave a picture—a pleasant watercolour of a swamp scene near Perth which he promised to me when I went to Cambridge, to remind me of home, but which I never actually got from him until I returned in 1934. His loss is all the harder to bear as it was comparatively sudden. Until about September last year, although he was becoming physically frail, he was up and about and expecting to continue his botanical writings for some time to come.

In appreciation of the late Thomas Francis Zirkler

The club has suffered a sad loss with the death on 29 March of Frank Zirkler, who joined the F.N.C.V. in 1957, and throughout the succeeding years took a most active part in the club's activities. In doing so, he endeared himself to all by his capacity for friendship and his example of willing participation.

Regular attendance at club meetings, group meetings, and excursions was supplemented by sterling work for the annual nature shows.

In the years 1960 and 1961 he was chairman of the Botany Group, and in 1965 was its secretary.

In 1962 he and his wife Jean (both grown up in Kerang, where Frank was born in 1904) enjoyed a trip to England, where they made contact with a number of clubs like ours and took part in outings with them. Frank joined the Kent Trust for Nature Conservation, retaining his membership ever since. While staying in London, they made many visits to Kew Gardens; and another highlight of their English sojourn was Peter Scott's Slimbridge in Gloucestershire.

Frank became interested in gemstones, gradually acquiring a good collection; and he enjoyed doing his own tumbling of interesting rock specimens picked up on the many excursions he took part in. He exhibited regularly at Geology Group meetings. Among his contributions to the *Naturalist* were articles on the 'Welcome Stranger' and 'Holtermann' nuggets of gold. He delighted in recalling incidents on the Tasmanian and Queensland F.N.V.C. excursions.

Frank's paternal grandfather migrated to Victoria as a mining engineer, and his own vocational field was aeronautical engineering. He was a great lover of good music, an interest shared with his wife, to whom the club offers sincere condolences.

J.A.B.

Field Naturalists Club of Victoria

GENERAL MEETING

11 May 1970

The President Mr T. Sault was in the chair and approximately 110 members were present.

He welcomed Mr Darrell Kraehenbuehl, secretary of the South Australian Field Naturalists.

Sympathy was expressed with Mr Hargreaves the Secretary of the S.G.A.P., on the death of his wife.

The Secretary, Mr. D. Lee, reported that 10 acres of land at Glen Waverley with almost the original ground cover of trees and shrubs, the only remaining natural locality in the area is in danger of development. Ratepayers want the Council to reserve it.

Mr. Garnet said that he had visited Boort recently, and had seen a lake that had been dry for a long time, now refilled through a channel. Pelicans have taken over and they had rounded up the red-fin fish, herding them towards the channel in such concentration that the fish had been crushed, and died of suffocation. Trees were labelled "possums nest here", "hawk's nest", "Shield tree", and a site of an aboriginal camp was indicated. Mr Baines pointed out that Boort meant "smoke" in aboriginal.

Mr. J. Willis said that he had found the Australian Anchor plant *Discaria pubescens* fifteen years ago on a basal

escarpment near Clunes. It was first noted by Major Mitchell. Yesterday Mr. Willis went back and found the same plants.

Mr Jean Woollard mentioned that cobwebs were spread like cloth on bracken on the road to Walhalla where rough tree ferns were well grown and plentiful.

The subject for the evening was "Banksias and their Relations of the family Proteaceae", by Mr. F. J. Rogers.

The President introduced the speaker and said he was the author of *A Field Guide to Victorian Wattles* and active in the Society for Growing Australian Plants.

Mr Rogers said there were about 650 species and 31 or 32 genera of the family Proteaceae in Australia. With the aid of beautiful colour slides he explained the features of the typical four-partite flower, and contrasted it with a mistletoe flower which also has four flower segments.

He illustrated the hard woody seed receptacles in *Banksia grandis, Hakea platysperma* and the *Xylomelum* woody pear but in *Persoonia* the seed is not in a hard case. Some, as in coast Banksia, shed their seed almost immediately, but in many others it is not shed until conditions are very dry or after a forest fire as in Waratah and Woody Pear.

He showed beautiful slides of many species of the genera *Banksia, Hakea, Grevillea, Lomatia, Synaphea, Persoonia, Petrophila, Lambertia, Isopogon, Orites, Franklandia, Dryandra, Adenanthos, Buckinghamia, Stenocarpus, Conospermum* and *Telopea.*

He recalled that Banks and Solander 200 years ago first collected *Banksia serrata, B. integrifolia,* and the handsome *B. ericifolia.* Recently Mr Willis named *B. canei,* from Wulgulmerang.

Of the more than 40 species of Banksia projected on the screen, most striking ones included the beautiful red *Banksia coccinia,* pink *B. menziesii* (extensively used for fire wood in W.A.), orange *B. ashbyi* and *B. prionotes,* long yellow heads of *B. grandis* with the massive collection of seed capsules.

Pendant types included orange *B. nutans,* yellow *B. elderiana* and *B. lehmanniana* with large flowers.

Prostrate species included red-brown *B. prostrata* reddish yellow *B. repens* and *B. goodii* (named after Good—botanist with Flinders 1801-2) and the "Cocky's beak" *B. candolleana.* Low growing *B. baueri* has a massive head of flowers 9 inches by 5 inches. Cockatoos feed *B. speciosa* seeds.

While the majority of Banksias are in W.A., *B. robur* is a striking Queensland form and *B. spinulosa* a handsome Victorian one. Of the twenty four grevilleas shown shades of red were most noticeable. Some of the West Australian red forms included *Grevillea wilsonii, G. macrostylis, G. tripartita,* many of them showing three partite leaves. *G. flexuosa* is a pink form and *G. polybotrya, G. occidentalis,* and *G. teretifolia* white.

Red *G. punicea* is a N.S.W. species while Victorian forms shown included pink *G. confertifolia,* golden *G. chrysophea,* red *G. dimorpha,* pink *G. barkleyana* red shaded *G. alpina;* and from Queensland orange *G. robusta.*

The 16 Hakeas shown revealed striking contrasts, the West Australian *Hakea victoriae* with expanded multicoloured tough leaves sheltering clumps of insignificant flowers, and the handsome long pink spikes of *H. multilineata* and reddish *H. bucculenta,* the pink *H. subsulcata,* red and white *H. laurina* and "sea urchin" *H. petiolaris,* and purple *H. myrtoides.* Red *H. orthorrhyncha* had red flowers on old wood. *H. verrucosa* showed spidery red flowers well down amongst widely spread out leaves.

From Victoria *H. nodosa* with small yellow flowers and pink *H. sericea* were shown.

Other West Australian forms included purple *Dryandra erythrocephala* and yellow and red *Lambertia inermis,* red *L. orbifolia,* yellow *L. echinata* and, from N.S.W., red *L. formosa* (mountain devil). *Isopogon drummondii* and *I. tridens* were W.A. forms.

Victorian *Telopea oreades* was outshone by the *T. speciosissima* of N.S.W. — perhaps the most splendid species of the family. Mr. Rogers recommended growing species of Proteaceae in gardens.

The President thanked Mr. Rogers for the most interesting talk and the slides.

Mr. L. Fell pointed out that many of the species could not be grown here except under special care.

The Secretary reported that the Ingram Trust has granted funds to print the Nature Show pamphlet which features penguins.

He said the C.S.I.R.O. are testing the hall for sound equipment and it is hoped

that there will be fixed amplifiers and a movable microphone.

Mrs. G. Taylor stressed the importance of the Save the Bushlands Meeting in the Lower Town Hall on 19 May.

Mr. R. G. Taylor spoke on the danger to one unspoiled area in Victoria from an application for rutile, zircon and ilminite exploration of 100 miles along the coast from Shipwreck Creek to seven miles west of the Snowy River, and for one mile inland all the way.

Mr. Garnet said that if mining companies get permission it would mean clearing away the top from the dunes by dredges and destroying everything.

Mr. Taylor moved that the F.N.C.V. Council write to the Minister of Mines to protest against giving of this permit. Mr. Garnet seconded the motion which was carried. It is regarded as the most serious issue since the "Little Desert".

The Native Fauna Conservation Society meeting will be held on 29 May at the Herbarium. Mr. Keith Dempster of the Fisheries and Wildlife will speak.

The Secretary said that if anyone wishes to be met at the corner of St. Kilda and Domain Roads to go to the Herbarium they could telephone 25 2415.

Dr. Brian Smith is making a survey of Non Marine Molluscs of Victoria. He appeals for members to assist by sending live specimens to the Museum, noting the locality.

The President asked for short contributions of nature observations to be sent to the Editor.

Mr. D. McInnes invited members to a Geology excursion on Sunday, 7 June, to the Maribyrnong River terraces.

Six new members whose names appear in the May Naturalist were elected.

Exhibits

Brent Russell brought three kinds of butterflies showing variation; i.e. Wanderer, Common Brown and Wood White.

Mr. A. J. Swaby had sporophytic buds on *Polystichum proliferum* and plants of *Pratia surrepens* — the latter for any members wishing to have one. Also a specimen of *Marchantia* with gemma cups.

Mr. Rogers had a large collection of fruits of the Proteaceae.

Mr. J. Morrison showed a fungus *Amauroderma rude.*

Mrs. Matches brought wood with blue *Mycena interrupta* and *Xerotus archeri* — fungi from near Fernshaw.

Other fungi from the Botany Group excursion between Dom Dom and Fernshaw included: *Trametes versicolor; Tyromyces semisupinus; Polyporus camytus; Schizophyllum commune; Marasmius sp.; Paxillus panuoides; Panettus stipticus; Merulius sp.; Hymenogastraceae* (underground); *Xerotus archeri.*

Mr. T. Sault: A box of fungi from Mornington Peninsula and a Chrysalis of a wood white butterfly.

Mr. Ken Strong showed a book scorpion under the binocular microscope.

Major H. Ford had a specimen of tachylitic basalt from Maidstone.

Mr. Curtis showed a slide of Truganinni, the last full-blood aborigine of Tasmania, who died about 90 years ago. This slide was made from a photograph lent by Mr. Vic Miller.

Mr. Darrell Kraehenbuehl pointed out that actually the last Tasmanian full-blood aborigine had died on Kangaroo Island, 1884, thus later than Truganinni.

Mr. Hanks said that Truganinni had wanted to be buried, but it has been said that the bones were put in a museum to keep them from being stolen.

* * * *

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Western Victoria Field Naturalists Clubs Association

Report on Club Activities for year 1969

(Compiled by J. Lineker, Hon. Secretary, Portland F.N.C.)

Reports from other Clubs will appear next month.

ARARAT

President: Mr. Stan. Kelly. Secretary: Miss Z. Banfield.
Membership 12 *Meets First Monday, C. of E. Hall.*

The Club held excursions with the Stawell Club and the Ballarat Club to the Mt. William picnic gound. The Club again exhibited a box of wildflowers from the district at the Nature Show in the Melbourne Town Hall, and also at the Barrier Field Naturalists Show at Broken Hill. Club members participated in an outing when 100 school children from Forest Hill school visited the district and were conducted through McDonald Park on a nature trail. The Club has been represented at the WVFNCA meetings at Colac and Kiata, and with Stawell were the hosts at the Annual Meeting at Stawell. During the year the President of the Bird Observers Club—Mr. Reg Johnson—visited Ararat and gave an illustrated lecture—"In the footsteps of Capt. Cook".

COLAC

President: Mr. R. J. Dennis. Secretary: Mrs. G. Skinner.
Membership 55 *Meets Second Friday (Feb.-Dec.) C.W.A. Rooms.*

Membership has increased this year and the attendance at meetings has improved greatly—attributed largely to the excellent guest speakers, and also the regular monthly excursions. One very pleasing factor is the growing number of school children attending meetings and excursions. Natural history covering fossils, ornithology, reptiles and botany has catered for all interests, and the specimen table has been a source of knowledge and interesting discussion.

The autumn meeting of the WVFNCA was held in Colac with our club acting as hosts. The excursions were around the local lakes and a picnic lunch at Beauchamp Falls near Beech Forest.

Our interest has been keen in the conservation field, especially the Little Desert and the Lower Glenelg areas; and we have co-operated in a tree planting expedition to the You Yangs. A proposal that we become caretakers of an area of approximately 1/3 acre at Barongarook and develop it as a members' plantation is receiving enthusiastic support and could develop into a worthwhile project.

We have been well represented at the WVFNCA meetings and in conjunction with the Geelong Club have had a series of investigation campouts in certain areas in the Otways with a view to having them preserved as National Park.

CRESWICK

President: Mr. A. W. Strange. Secretary: Mr. H. L. Barclay.
Membership 24 *Meets Second Thursday, Wesley Hall, Creswick.*

Meetings had a high percentage of attendance throughout the year, and various speakers contributed syllabus items. Two highly successful nights were contributed by members who had done much research work in preparation of their addresses. Outings were numerous and well attended.

During the year the Club has been successful in having obtained an area of land being held by the Lands Dept. as a Flora Reserve—the Club is working on checking the plant life here with the Plant List of the District.

DONALD

President: Mr. R. P. Falla. Secretary: Mrs. B. K. Grewar.
Membership: Adult 27, Junior 9. *Meets First Friday Primary School Centre.*

Another successful year has maintained the interest and enthusiasm of members and the nine meetings have given an excellent average attendance. A feature of the programmes has been the increased contributions by club members. Representation of members was good at the WVFNCA meetings at Colac and Kiata, and with the Stawell Club an excursion was held through the Barkly and Redbank districts. A local excursion of much interest was to see some of the rarer trees of our own district. A conservation project, in co-operation with the Shire Council, is to have the Mt. Jeffcott area proclaimed a Reserve.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1970/71

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 13 July—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Nature Notes and Exhibits.
3. Subject for the evening—"A Biological Survey of Victoria": Mr. R. T. M. Pescott, retiring Director of the National Herbarium and Royal Botanic Gardens.
4. New Members.

Ordinary:
Mrs. Alice Ryan, Flat 25, 150 Inkerman Street, St. Kilda, 3182.

Joint:
Messrs. J. B. & R. N. Jack, 9 Glendale Street, Surrey Hills, 3127. (Interest—Geology.)

Country:
Mr. Peter Robson, Tatong, via Benalla, Vic., 3672
Mrs. D. Algie, "Balgowan," Neerim South, 3831.

5. General Business.
6. Correspondence.

10 August — To be announced.

GROUP MEETINGS

(8 p.m. at the National Herbarium unless otherwise stated.)

Thursday, 9 July—Botany Group. Mr. P. Kelly will speak on "Moulds."

Wednesday, 15 July—Microscopical Group.

Friday, 31 July—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 3 August—Entomology and Marine Biology Group meeting at 8 p.m. in small room next to Theatrette at National Museum.

Wednesday, 5 August — Geology Group. Subject — Koonwarra and the Fossil Feather: Mr. P. Duncan.

Thursday, 6 August—Mammal Survey Group meets in F. & W. Research Centre, cnr. Brown St. and Stradbroke Ave., Heidelberg, at 8 p.m.

Friday, 7 August—Junior meeting at Rechabite Hall, 281 High St., Preston, at 8 p.m.

Thursday, 13 August—Botany Group. Mr. B. Fuhrer will speak on "The Seaweeds of Boags Rocks."

Friday, 14 August—Montmorency and District Junior F.N.C. meets at 7.30 p.m. in Scout Hall at Petrie Park.

F.N.C.V. EXCURSIONS

Sunday, 12 July—Botany Group Excursion, Westernport Bay. Meet at Frankston Railway Station. Bus leaves from Station at 11 a.m. if insufficient private transport.

Sunday, 19 July—Dandenongs. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.40. Bring one meal.

Sunday, 9 August—Botany Group. Wattles at Warrandyte. (Ring Mr. Kleinecke—25-2415).

Saturday, 29 August to Sunday, 6 September—Wyperfeld National Park and Little Desert camp out. The plan is to travel to Wyperfeld on Saturday, 29 August remaining there until Wednesday, 2 September, then going to Broughton's Waterhole in the Little Desert where we will meet local naturalists who are planning that section of the excursion. Members will be responsible for their own food and camping gear but a larger tent will be taken where meals can be eaten and members gather if it is cold. Food supplies can be replenished during the week. The coach fare will be $18.00 and this should be paid to the excursion secretary by the end of July. All cheques to be made out to Excursion Trust. Camping gear can be hired very cheaply if necessary.

Saturday-Sunday, 17-18 October—Weekend excursion to Castlemaine with the Bendigo F.N.C. Motel accommodation has been booked and the weekend should cost approximately $14.00 plus picnic meals Saturday and Sunday.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: E. King

F.N.C.V.

Vol. 87, No. 7 9 July, 1970

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Front Cover:

This skilfully executed pencil sketch is the subject of an article on page 204. It was drawn by Von Guerard, and dated 1857.

Some Observations on the Relative Drought Resistance of Two Eucalypt Species near Airey's Inlet

by J. B. Kirkpatrick*

The 1967/8 drought in Victoria was so severe that many eucalypts were damaged or killed. This provided an excellent opportunity to study the relative resistance to moisture stress of associated species of eucalypts. Where species that are found generally in areas of distinctly different rainfall, occur in association on the margins of their distribution, evidence of drought damage was most likely to be found.

Observations of such an ecotonal association were made in May 1968, and again in October 1969, to assess relative damage and recovery. The study area was north of Airey's Inlet in the Otway Ranges. It was on mudstones of Jurassic age at an elevation of 400 feet, on the northern slope of the Painkelac Creek valley, on a steeply declining north-south ridge (Figure 2). The stand consisted of an equal mixture of Blue Gum (*Eucalyptus globulus* x *bicostata*) and Ironbark (*E. sideroxylon*) with an occasional Messmate (*E. obliqua*). Downslope towards both Painkelac

*Research student, Melbourne University Geography Department.

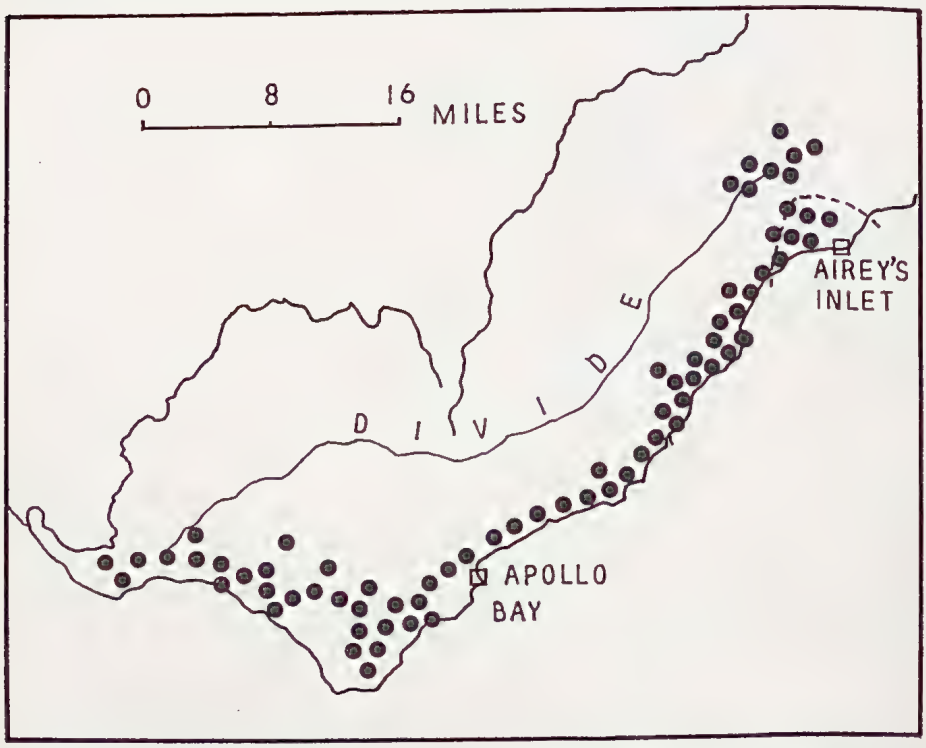

Figure 1. The distribution of Blue Gum (dots) and Ironbark (limits shown by dashed line) in the Otway Ranges.

Creek to the south and the two ill-defined valleys to the east and west, the Blue Gum became progressively more pure, being replaced on the alluvium on either side of the creek by Manna Gum (*E. viminalis*). Upslope the Ironbark was associated mainly with Messmate, although an occasional Blue Gum and Scentbark (*E. aromaphloia*) occurred. On nearby northern aspects Peppermint (*E. radiata*) formed a sparse low sclerophyll shrub woodland where an occasional stunted Ironbark was observed. Figure 3 looks south over this association towards Painkelac Creek. The study area is not visible, but similar drought damage is evident in the photograph, directly opposite it on the southern slope of the valley.

The Blue Gum in the Otway Ranges is a probable hybrid swarm, showing a complete range of intermediates between *E. bicostata* and *E. globulus*. It occurs mainly in a relatively narrow coastal strip, but is also found on parts of the more easterly north-facing slopes (Figure 1). Its distribution in the Otway Ranges is disjunct from the nearest occurrences of both putative parent species. Bass Strait and the low rainfall basalt plains to the north having probably been effective barriers to recent gene-migration. It occurs between the 30 and 60 inch mean annual isohyets, mainly on acidic sandy clay loams over mottled yellow clay

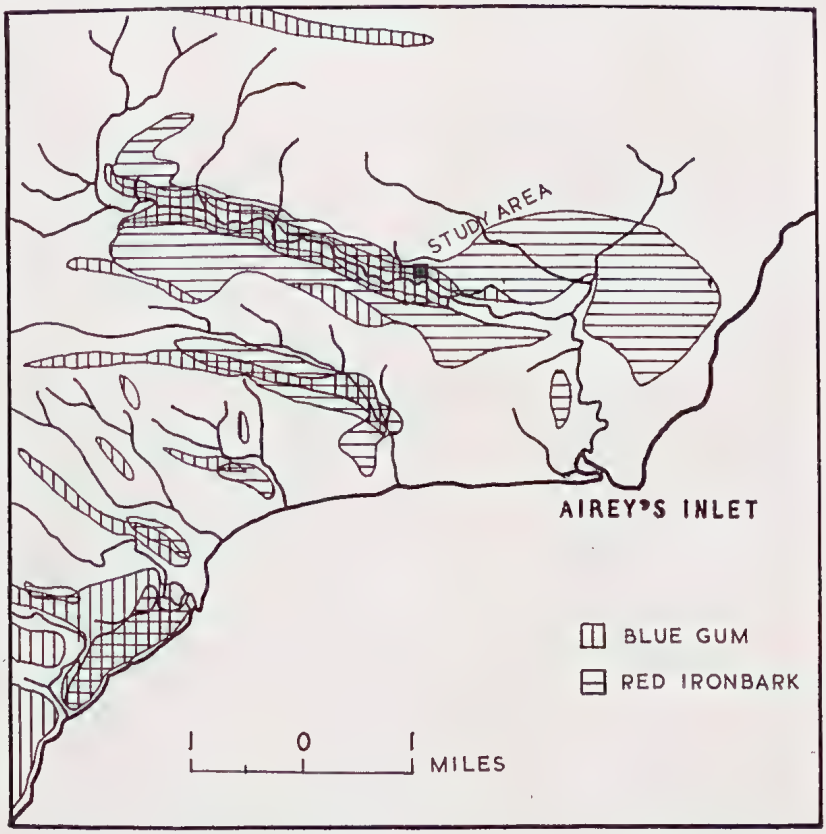

Figure 2. Detailed distribution of the two species in the Airey's Inlet region.

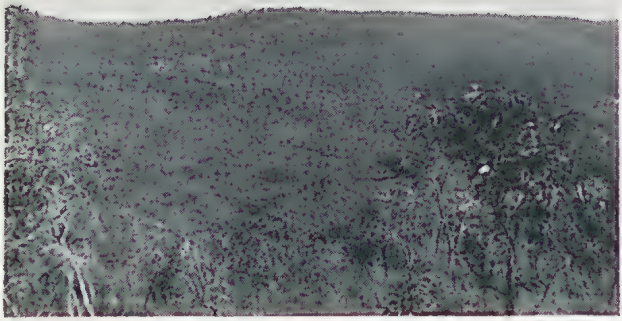

Figure 3.

A drought affected stand of Blue Gum shows up as a white strip amongst the dark colour of the surrounding healthy trees at the top left (see text).

subsoils formed on Jurassic sandstones and mudstones.

Ironbark, in contrast to Blue Gum, is only found in a limited area of the Otway Ranges around Airey's Inlet on the seaward slopes. The nearest stands are in the Anakie Ranges to the north of the basalt plains. It is found between the 27 and 33 inch mean annual isohyets on both similar soils to Blue Gum and on sandy acidic yellow mottled soils, often with embedded ironstone, formed on Tertiary deposits. It associates more extensively with Mountain Grey Gum (*E. cypellocarpa*) and Messmate than with Blue Gum and also associates ecotonally with Peppermint, Scentbark, Manna Gum and Swamp Gum (*E. ovata*).

Ironbark and Blue Gum are rarely found growing together outside the Otway Ranges, Blue Gum being a tree of wetter forests than those in which Ironbark usually occurs. In the limited area of the Otway Ranges where both are found both ecotones and abrupt boundaries are observable (Figure 2), depending on the steepness of the environmental gradient. The Ironbark stands occupy areas which, compared with Blue Gum stands in the vicinity, would appear to have less available moisture. Thus Blue Gum is found downslope from Ironbark and on the less exposed aspects of hillsides and ridges.

The stand studied was apparently even-aged, the trees having the appearance of saplings, varying in height from approximately ten to twenty feet. The Blue Gums were almost all taller than the Ironbark. Of the sixteen Ironbark trees only one had even partial drought symptoms, yet of sixteen Blue Gums in the same stand all but one were severely affected, most of them having all their leaves killed by the drought, and no signs of epicormic shoots developing in May 1968. By October 1969 there were epicormic shoots on most of the Blue Gum, but some of the smaller trees had died and none looked particularly healthy.

The difference in size between the two species suggests that Blue Gum might suppress Ironbark when there is adequate moisture for Blue Gum to establish itself. The author has seen suppressed Ironbark under Blue Gum elsewhere in the Otway Ranges, which would tend to support this theory.

The incidence of drought effects suggest that Ironbark, possibly because of its slower growth rate, has far greater tolerance to drought conditions than Blue Gum.

Acknowledgements

I would like to thank Dr. R. F. Parsons for help with the work and Dr. E. C. F. Bird for critically reading the manuscript.

Readers' Nature Notes and Queries

Wombat On Vermin List?

Here is a note of concern for one of our native animals from Ellen Lyndon in Victoria.

Among the various displays touring the country Agricultural Shows last summer, was one set up by the Vermin & Noxious Weeds Destruction Board, dispensing information to farmers on the most effective means of dealing with plant and animal and other pests.

At Leongatha Show on 21/2/70 four mounted specimens of "vermin" were on view; the fox, rabbit, hare, and the wombat. As Australians we felt ashamed that a harmless native herbivore should be classed and displayed with the introduced pests.

Reptilian Memory

From Mr. J. C. Le Souëf, son of the early Naturalist, Dudley Le Souëf, come these interesting comments on Reptiles and Birds.

Although one does not usually associate memory with reptiles, a recent incident at the Rosebud Aquarium and Museum seems to indicate that at least the Amythestine Python from North Queensland does have the ability to recall earlier conditions.

One fifteen foot specimen, picked up on the Bloomfield Road, at the Lion's Den, near Cooktown in July 1968, had spent last summer in a large netted enclosure outside, sleeping on cool nights in a box on the ground. During the winter it was housed in a heated case inside the building.

It was recently returned to its summer quarters. As soon as the sun had left its basking plank, it at once moved directly to its den on the ground. By its actions, it seemed obvious that it was quite familiar with its surroundings in contrast to the usual practice of the new arrival in making a long tour of inspection before settling down to a regular camping spot.

Cockatoo Playground

The sight of cockatoos "playing", particularly on telegraph wires, is well known; but the existence of a communal playground, used by two different species seems worth recording.

Near the Diversion Dam at Kunanurra in North West Australia there is a green sward beside a small lagoon with power lines passing behind it. One evening in July last, I spent half an hour watching the antics of some two hundred corellas, part of the tremendous flock which inhabits this area. At first I thought that they were feeding, but a second glance showed that they were having a real "box on". Everywhere pairs could be seen rolling over and over with much squawking. The twos would separate only to start on another neighbour.

The power lines provided a trapeze with a constant stream of birds flying from the ground to the wires, swinging upside down on the wires and returning to the ground again.

After tiring of the fun, they flew off to neighbouring roosting trees by the water, others coming in to take their places.

The population of galahs is not nearly as great as that of the corellas, although there were quite a number about. Early on the same day the local galah population used this same playground for their "daily dozen", before setting off for the serious business of searching for food.

book review

Australian Opals in Colour

by Nance and Ron Perry, F.G.A.A.

A. H. & A. W. Reed, 1969.
Pp. 112, inc. 86 col. pl1. $3.95.

Bert sent down the billy. "Not that," I shouted. "Send down the four-gallon drum."

Thus was one of the biggest lumps of opal ever found brought to the surface at Coober Pedy; and with a conversational approach this book provides an interesting though in parts somewhat superficial introduction to Australian opal fields, and of the distinctive way of Australian life found upon them.

Lightning Ridge, Coober Pedy, Andamooka and Queensland fields are discussed, various facets of their community life illustrated by photograph, and the shadows of outback history lengthened a little in the book's easy account of opal-miners and their outlook, as well as in its telling of such legendry figures as Isobel MacIntosh the Eulo Queen.

Wisely incorporated however are valuable contributions from Gaskin, Darragh, and Sanders of C.S.I.R.O. on opal in general, its nature and origin, and upon synthetic opal research. From the Queensland Mining Journal there is a section on the "Kernal Bands". Other chapters deal with types of opal mining, how to cut opal, opal doublets and triplets, treatment of opal chips and points on buying and selling. Practical advice given for intending travellers includes reference to facilities available in various areas and their likely costs. The inclusion of a list of spare parts needed for vehicles taken into opal country is timely.

The authors have a love for this truly beautiful Australian gem, and an awareness of its potential on the Australian scene. The glory of opals emerges from its excellent colour plates. The book opens a door for those unacquainted with opal seeking as a pursuit of increasing popularity and fascination.

(A. R. McEvey)

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Wolf Creek, Australia's Largest Meteorite Crater

by

A. W. Beasley*

Few people know that Australia possesses the second largest crater in the world that is definitely known to be caused by meteorite impact. This huge crater is situated near Wolf Creek some 65 miles south of Halls Creek in Western Australia, and is known as the Wolf Creek meteorite crater.

In recent years there has been increased scientific interest in meteorite craters because of the presumed kinship between the craters on the earth's surface and those on the moon. This has resulted in more detailed study of the Wolf Creek and other meteorite craters.

The Wolf Creek crater was discovered in 1947 by Dr. F. Reeves and Mr. N. B. Sauve of the Vacuum Oil Company during an aerial reconnaissance of the area. Dr. Reeves reported (Reeves and Chalmers, 1949) that from the air it looked like a huge bomb crater and that, on first sighting, they thought it to be of meteoritic origin. Soon after its discovery, a land inspection was made by Reeves but, during the short time spent at the crater, no meteoritic material was found.

During 1948 a geological party from the Commonwealth Bureau of Mineral Resources, headed by R. S. Matheson and D. J. Guppy, examined the crater and discovered evidence of its meteoritic origin. They found fragments of meteoritic ironstone scattered around the crater rim, particularly along the southern sector. Guppy and Matheson (1950) gave the first detailed description of the crater.

The crater is situated in an area covered by loose sand with occasional low dunes and sparse vegetation. Precambrian quartzites outcrop a few miles north of the crater and these rocks are also exposed in the crater walls. Viewed from the land the crater appears as a flat-topped hill that rises 70 to 100 feet above the adjacent sandy desert. The outer slope varies from 10 to 15 degrees, and consists of piles of unsorted, broken quartzite.

The average depth of the crater below the rim is 160 feet, or an average depth of 70 feet below the general land surface. The crater was originally somewhat deeper, but the inner portion has been partly filled with sediments. The inner slope of the crater wall is steep, ranging from 30 to 40 degrees, and the top 90 feet or so of this wall is composed of angular blocks and pieces of quartzite thrown up by the explosion of the meteor. Below this the quartzite bedrock occurs. The quartzites are tilted, generally with an outward dip; this is considered to be due to movement resulting from the meteoric explosion.

The crater is almost perfectly circular; the diameter of the floor is approximately 2,800 feet, while the maximum diameter of the crater from rim to rim is 3,075 feet. The floor is essentially flat and is covered with loose sand and light porous gypsum. There is a very slight rise from the central area to the abrupt face of the crater wall.

Chemical analysis of a sample of the heavy metallic material found

* National Museum of Victoria.

around the crater rim by Guppy in 1948 gave 1.9% of nickel oxide, "which is far in excess of what would be expected in terrestrial rock" (Reeves and Chalmers, 1949). Another specimen of this ironstone, submitted by Guppy to the Western Australian Government Chemical Laboratories, was found to contain particles of metallic nickel-iron. LaPaz (1954) also reported streaks and granules of metal which he considered to be nickel-iron in specimens of this oxidized material.

Pieces of this oxidized meteoritic material were once moderately abundant around and near the crater rim, but have now been extensively collected. They take the form of ball-like bodies of various sizes that range up to 300 pounds in weight (McCall, 1965). Apparently they were formed from the weathering and alteration of meteoritic iron fragments; they are now composed mainly of limonite (hydrated iron oxide).

Taylor (1965) recorded the discovery in 1965 of fragments of typical nickel-iron meteorite around the Wolf Creek crater. Sections cut through these fragments, when polished and etched, showed characteristic Widmanstatten structure. The fragments were found lying on the surface near but outside the crater. Most were of small size. Chemical analysis gave a nickel content of 8.6% and a cobalt content of 0.4%, which is close to the average of all iron meteorites reported by Mason (1962).

The Wolf Creek crater is the result of a meteoric event which was in every way catastrophic. An unusually large meteoric body, probably weighing thousands of tons, reached the earth's surface with most of its cosmic velocity intact. The resulting impact had most of the characteristics of a nuclear explosion. Fortunately, very few large meteors penetrate the earth's atmosphere. Scientists consider that they arrive on the earth probably

Fig. 1: Aerial view of Wolf Creek meteorite crater, Western Australia.
Photo: W. Pedersen.

at the rate of only about forty every million years. Many of them fall in the sea, and large meteorite craters on the earth's surface are accordingly rare. Professor N. M. Short (1967b) lists twelve definite meteorite craters and six probable ones formed during the last two million years. The Wolf Creek crater is second in size to Meteor Crater in Arizona, U.S.A., among craters with associated meteoritic material.

Study of the Wolf Creek crater suggests that it is geologically young. Short (1967b) has listed its age as Pleistocene (between 10,000 and 2,000,000 years old). Preservation of the crater has been favoured by the arid climate. The extent of its erosion is not very great, but the crater depression has been partly infilled with sediments. According to Short (1967a) the reason why pieces of meteorite have not been found in great quantity around craters such as Wolf Creek is because such large meteorites become vaporized, fragmented and dispersed during the explosion-like impact.

Fig. 2

Map showing location of Wolf Creek meteorite crater.

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Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

Native Mammals in Victoria – IV

Mammals of the Riddell District

by

J. W. F. Hampton* and J. H. Seebeck*†

Summary

The mammalian fauna of an area of forest in the hills north and west of the village of Riddell in the Shire of Romsey, Victoria, was examined by means of four detailed surveys of representative areas. Thirteen native and four introduced species were recorded. The effect of the severe drought in 1967-68 on the mammal population did not appear to be as drastic as was expected. The value of the area as a faunal reservoir is discussed.

Introduction

About forty miles north-west of Melbourne a complex group of hills, dominated by Mount Macedon, stands up from the flat surrounding plain. The scrub and forest covered south-eastern slopes with the lesser peaks of Mount Eliza, Mount Charlie and Mount Robertson, form a marked ecological contrast to the open agricultural lands below. The differing soils, rainfall and vegetation on these slopes have given rise to a varied environment and the area has become a refuge for a number of species of native animals. No previous investigations of the mammals present in the area have been reported. A preliminary survey of the mammal fauna was therefore carried out by the Mammal Survey Group in order to assess the value of the area as a faunal reservoir before the pressures of urban development become acute.

This report describes the results of the work of the Mammal Survey Group during the Spring of 1967 and the Spring of 1968. Three surveys were carried out in 1967, and a year later, one of the areas was re-examined in order to try to assess the effects of the severe drought in the Spring and Summer of 1967-68. Additional data collected in the area at other times is also included in this report.

The names of the members of the Group whose work provided the data upon which this paper is based are listed in the Authors' Acknowledgements.

Description of the Area

History

Much of the hill country was cleared for farming about 100 years ago, but from about 1890 onwards farms were abandoned and gradually reverted to forest. The surrounding plain has, however, remained completely cleared, leaving the hills as isolated areas of forest and scrub. Until the nineteen-twenties commercial quantities of timber were being extracted and some timber cutting is still carried out. The area consists largely of privately owned land with some areas of State Forest and water-catchments.

*Mammal Survey Group, F.N.C.V., c/o Secretary, 40 Howard Street, Reservoir, 3073.

†Fisheries and Wildlife Department, Victoria.

Geology

The geology of the area has been described in detail by Skeats and Summers (1912). The soils in the hills are derived from Upper Devonian Kerrie Conglomerates (Surveys 1 and 3) and Upper Ordovician Siltstones (Survey 2) and are generally very sandy and gravelly and of poor agricultural value. Riddell itself lies on Quaternary Olivine Basalt and this formation with its deep, rich soils surrounds the hills on their southern and eastern boundaries.

Rainfall

No official meteorological figures are available for the area which was the subject of these surveys, but the means for Macedon (Forests Commission Office, 23 year record) and for Riddell (Miss Amess's records for the past 17 years) are given in Table I in which is also included the rainfall recorded at Kerrie for 1968 only (record from the Best property at Kerrie). This latter was recorded at a point only 1 mile east of the area of Survey 2.

During the period of the 1967 surveys the spring rains had failed, the countryside was drying up and the first indications were appearing of the severe drought which was to follow. During the subsequent summer the rainfall in general was the lowest for 30 years.

At all three survey sites the creeks were running at the time of the surveys and it was interesting to find that, though they had all dried up during the summer, the level of water in Main Creek at site 2 was about an inch higher in November, 1968 than in October, 1967.

Areas surveyed

The method adopted by the Group in making a preliminary survey is to select areas which are representative of the different kinds of habitat present and to subject these "sample" areas to fairly intense surveys in which the mammal fauna is methodically examined.

Three areas were chosen for sample surveys and these are shown on the accompanying map (Fig. 1). They are referred to as Survey 1, on Conglomerate Creek, September, 1967; Survey 2a on Main Creek, October, 1967; Survey 2b, at the same site in November, 1968 and Survey 3, near Charlie's Creek in November, 1967.

Survey 1.

The first site chosen was on a rocky, predominantly south-facing slope, immediately above the flat cultivated area, at the point where

TABLE 1.

Rainfall.

Monthly mean in inches for Macedon (23 years) and Riddell (18 years) and the 1968 record for Kerrie.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Macedon	1.76	2.72	2.00	2.62	3.66	3.23	3.94	3.78	3.69	3.91	2.78	2.32	36.51
Riddell	1.79	1.18	2.13	2.42	2.34	3.24	2.41	2.45	2.78	2.56	2.28	1.81	27.39
Kerrie	0.98	0.03	0.91	2.08	7.11	2.95	3.80	4.59	1.23	2.36	1.92	2.47	30.43

Conglomerate Creek flows on to the plain. The creek at this point runs in a narrow, steep-sided, rocky gully. The forest was predominantly of Messmate, open, uneven and with gaps due to felling. The shrub layer was sparse and the ground cover thin on the east-facing slopes but denser on the west-facing slopes. A detailed description of the vegetation is given in the appendix.

Surveys 2a and 2b.

The vegetation on Main Creek at this site was in marked contrast to that at Conglomerate Creek and represented the richest type of habitat to be found in the area. There was a layered forest of more complex composition, up to 100 feet in height, dominated by Manna gum and Messmate near the stream, with Blackwood and Silver Wattle forming the understorey, over a dense and varied shrub layer and a dense, grassy ground cover. The vegetation was less dense and differed on the southern and northern-facing slopes of the valley. This is described in detail in the appendix.

Survey 3.

This site, on the northern face of Mount Charlie, represented the driest type of habitat in the whole area and consisted of sparse Messmate, a shrub layer of widely scattered clumps of young Silver Wattle and very sparse ground cover. The area had been severely burnt two years previously. The forest became more dense on the upper rocky slopes. Most of this survey area has since been cleared.

Methods

The methods used in this survey have been described previously (Seebeck, Frankenberg and Hampton 1968). Mist nets were not used. Skeletal remains, owl pellets and other similar materials were collected during the survey but these did not provide evidence of any species other than those seen or trapped.

Results

Details of the survey effort and the crude trapping and spotlighting

Table II.

Summary of survey effort, trapping and spotlighting data and daylight sightings.

Survey No.	Date	Trap-nights	Specimens trapped	Spotlight-hours	Specimens seen*	Number of Species Identified
Reconnaissance	Aug. 1967	—	—	—	15	2
Survey 1	Sept. 1967	81	4	17	40	10
Survey 2a	Oct. 1967	81	25	16	36	5
Survey 2b	Nov. 1968	81	15	16.2	34	6
Survey 3	Nov. 1967	62	6	15	37	7
TOTAL		305	50	64.2	162	17

*Includes daylight sightings.

results are given in Tables II and III. A systematic list of the mammal species encountered in the area is given in Table IV. Thirteen indigenous and four introduced species were recorded.

Notes on the Species Recorded

Specimens which have been retained are designated by their registration numbers in the collection of the Fisheries and Wildlife Department, Victoria.

Order MONOTREMATA

Family Tachyglossidæ

1. Echidna, *Tachyglossus aculeatus*

Although many diggings and scratchings indicative of Echidna were noticed, only two individuals were seen during the surveys. One Group member (D. Reeves) who lives at Riddell, reports having seen not less than 40 Echidna in the district in the period 1964-1969. This species therefore appeared to be fairly common. No specimens were collected.

Family Ornithorhynchidæ

2. Platypus, *Ornithorhynchus anatinus*

The presence of this species in the area has been reported to us by several observers although none was seen during the survey period. Mr. H. Wheelwright recorded Platypus in Riddell's Creek below Yellowstone Farm in 1947, 1949, 1952 and 1954. Mr. G. Douglas, a Group member, reported a Platypus in Sandy Creek, near Ranoch Farm, in 1962 and Mr. A. John, a farmer of "Rocky Creek," reported Platypus in Riddell's Creek at Junction Hole in the spring of 1968.

TABLE III.

Apparent abundance of species (numbers seen or caught)

Species	Survey No. 1.	2a.	2b.	3.	Other Sightings
Tachyglossus aculeatus	1			1	
Ornithorhynchus anatinus					See text
Antechinus stuartii	1			1	
Phascogale tapoatafa					2
Sminthopsis crassicaudata					8
Petaurus breviceps	3				2
Pseudocheirus peregrinus	17	32	15	26	
Trichosurus vulpecula			1		7
Phascolarctos cinereus	8	6	12	9	10
Wallabia bicolor	1	1	3	4	1
Macropus giganteus	9				5
Rattus fuscipes assimilis		26	15	5	
Rattus rattus	3				
Chalinolobus gouldii		1			
Oryctolagus cuniculus	1		2	1	
Lepus europaeus					1
Vulpes vulpes	1				

TABLE IV.

Systematic list of mammals of the Riddell area

Order MONOTREMATA

Family Tachyglossidae	
1. Echidna	*Tachyglossus aculeatus* (Shaw)
Family Ornithorhynchidae	
2. Platypus	*Ornithorhynchus anatinus* (Shaw)

Order MARSUPIALIA

Family Dasyuridae	
3. Brown Phascogale	*Antechinus stuartii* MacLeay
4. Tuan	*Phascogale tapoatafa* (Meyer)
5. Fat-tailed Dunnart	*Sminthopsis crassicaudata* Gould
Family Phalangeridae	
6. Sugar Glider	*Petaurus breviceps* Waterhouse
7. Ringtail Possum	*Pseudocheirus peregrinus* (Boddaert)
8. Brushtail Possum	*Trichosurus vulpecula* (Kerr)
9. Koala	*Phascolarctos cinereus* (Goldfuss)
Family Macropodidae	
10. Black Wallaby	*Wallabia bicolor* (Desmarest)
11. Grey Kangaroo	*Macropus giganteus* Shaw

Order RODENTIA

Family Muridae	
12. Bush Rat	*Rattus fuscipes assimilis* (Waterhouse)
13. Black Rat	*Rattus rattus* (Linnaeus)

Order CHIROPTERA

Family Vespertilionidae	
14. Gould's Wattled Bat	*Chalinolobus gouldii* (Gray)

Order LAGOMORPHA

Family Leporidae	
15. Rabbit	*Oryctolagus cuniculus* (Linnaeus)
16. Hare	*Lepus europaeus* Pallas

Order CARNIVORA

Family Canidae	
17. Fox	*Vulpes vulpes* (Linnaeus)

Order Marsupialia

Family Dasyuridae

3. Brown Phascogale, *Antechinus stuartii*

This species seemed to be uncommon in the area. Only two specimens were trapped, one near Conglomerate Creek and one south of Charlie's Creek, the latter a lactating female. Both were caught in rather open, dry, areas some distance from creeks in the spring of 1967. In addition, the mummified remains of a third specimen, associated with fox droppings, were found above Conglomerate Creek. However, most trapping took place during that period of the year at which population levels of *Antechinus stuartii* are at their lowest (Wakefield and Warneke 1967).

Specimens: Skin and skull: D.712♀, 24 Sept. 1967; skin and skeleton: D.708 unsexed, 24 Sept. 1967.

4. Tuan, *Phascogale tapoatafa*

One specimen, a young female, was found at the home of Mr. G. Douglas, at Riddell. Presumably it was killed by a cat. A second specimen was shot at a fowl-house in June 1969, within a mile of Riddell. The Fisheries and Wildlife Department has a specimen from New Gisborne (4 miles west of Riddell) and the Department also has records of the species from a number of localities in the Macedon area —Woodend, Lancefield and Romsey. It appears therefore that Tuans were widespread in the drier forest areas of the whole district. This species is rarely seen or trapped in the wild, most specimens being collected by cats or during tree felling.

Specimens: In spirit: D.856♀, 4 Jan. 1969; skin and skull, D.924♂, 23 Jun. 1969.

5. Fat-tailed Dunnart, *Sminthopsis crassicaudata*

Although this species was not encountered during the survey period, eight juveniles (4♂♂, 4♀♀) were collected in the vicinity of Clarkfield, four miles E.S.E. of Riddell, by J. Wombey, a former member of the Mammal Survey Group, in October 1962. This species might therefore also be found in the open farmland surrounding the township of Riddell.

Specimens: In spirit: D.473♂, D.480♀, D.482♀, D.483♂, 6 Oct. 1962.

Family Phalangeridae

6. Sugar Glider, *Petaurus breviceps*

This species was seen in only one area, on the south-eastern slopes of Mount Robertson, overlooking Conglomerate Creek. The animals seen were in Manna Gum (*Eucalyptus viminalis*) and Messmate (*E. obliqua*). The presence of Sugar Gliders in this area was indicated by the typically torn and scratched bark of stringybark eucalypts, caused by their search for grubs and other invertebrates. There are specimens in the Fisheries and Wildlife Department collection from New Gisborne (1966) and from Mount Macedon (1965) and it appears that while the local population may not be high, the species is probably widespread. Owing to its remarkable agility and often cryptic behaviour, this animal is not easily seen by spotlight and is seldom recorded during surveys. No specimens were collected.

7. Ringtail Possum, *Pseudocheirus peregrinus*

Ringtail Possums were apparently the most common phalangerids in the area. Large numbers (relative to the other species encountered) were seen in all areas investigated. Al-

though it is not possible to give an estimate of the population level, it may be presumed to have been high. The reason for this relatively high population in the survey areas is not known. Those animals seen were in a variety of trees including Messmate (*E. obliqua*), Manna Gum (*E. viminalis*), Peppermint (*E. radiata*), Silver Wattle (*Acacia dealbata*) and Black Wattle (*A. mearnsii*).

Specimens: Pick up skulls: P. 698 unsexed, P. 699 unsexed, 24 Sept. 1967.

8. Brushtail Possum, *Trichosurus vulpecula*

It is apparent from our survey records and the observations of local residents that Brushtail Possums were not common in the bush areas around Riddell but were more often encountered in the vicinity of the township itself. Only one animal was seen during the survey work, south of Mt. Charlie, in November 1968. However, up to seven have been seen along Riddell's Creek, mainly in introduced trees such as Hawthorn, Willow and Oak. Single individuals have been seen at other sites within the township. Road-killed Brushtail Possums have also been reported near Sunbury, some nine miles south-east of Riddell. No specimens were collected.

9. Koala, *Phascolarctos cinereus*

Relatively large numbers of Koala were observed in all areas examined and many other sightings in the general vicinity of Riddell are recorded in the Group's files. At least half the animals seen during the organised surveys were observed in daylight. In addition, the skeletal remains of four animals were found. Koalas were seen in Messmate (*E. obliqua*), Manna Gum (*E. viminalis*), Narrow-leafed Peppermint (*E. radiata*), Silver-leaf Stringybark (*E. cephalocarpa*) and Mountain Grey Gum (*E. cypellocarpa*).

Specimens: Pick up skulls: K.179 unsexed, K.180 unsexed, 18 Nov. 1967.

Family Macropodidae

10. Black Wallaby, *Wallabia bicolor*

A few individuals were seen in each area investigated. Small numbers have been reported from the area by locally resident Group members. The species is apparently widespread in the hills above Riddell. Skeletal material identified as *Wallabia bicolor* was found on several occasions.

Specimens: Pick up skulls: MB.1904 unsexed, 24 Sept. 1967; MB.1942 unsexed, 21 Oct. 1967.

11. Grey Kangaroo, *Macropus giganteus*

Pairs and groups of animals were seen on four occasions in daylight and once at night. At one site, near Conglomerate Creek a small group of Grey Kangaroo has been seen regularly over the past few years by local residents. No specimens were collected.

Order Rodentia

12. Bush-rat, *Rattus fuscipes assimilis*

With the exception of the area around Conglomerate Creek, close to farmland, where no Bush-rats were collected, this was apparently the most common ground mammal in the area. However, population levels appeared to vary within the areas trapped. At site 2, the number of Bush-rats caught was 3 to 5 times as great as at site 3 where there was much less ground cover.

Specimens: Skins & skulls: R.3220 ♂, R. 3221 ♀, R. 3222 ♀, R. 3223 ♀, R. 3224 ♂, R. 3225 ♀, 22 Oct. 1967.

13. Black-rat, *Rattus rattus*

This species was found only in the rocky gorge of Conglomerate Creek. Few animals were trapped and it seems probable that the close proximity of human habitation to this site had enabled *R. rattus* to spread and apparently to displace native rodents. No Bush-rats were trapped in this area and the only native mammal trapped was one *Antechinus stuartii,* a species which probably does not compete with *R. rattus.*

Specimens: Skins & Skulls: R.3205♀, R.3206 ♂, 24 Sept. 1967.

Order Chiroptera

Although many bats were seen in the area, only one was collected. The specialized techniques necessary to assess the numbers and species present were beyond the scope of this survey but there may have been several more species of Microchiroptera in the area.

Family Vespertilionidae

14. Gould's Wattled Bat, *Chalinolobus gouldii*

One of this species was shot on the wing just before dusk at site 2. A number of bats were seen in the vicinity.

Specimen: In spirit: ♀ 21 Oct. 1967.

Order Lagomorpha

Family Leporidae

15. Rabbit, *Oryctolagus cuniculus*

Few Rabbits were seen during the survey period and little sign of their presence was evident within the forest. Local control measures probably kept the population in check.

16. Hare, *Lepus europaeus*

There appeared to be a small population of Hares in the grassland around Riddell. One specimen was seen on the Riddell-Lancefield Road near Bolinda Creek in November 1968. The apparent low level of population may be due, in part, to local rabbit control measures.

Order Carnivora

Family Canidae

17. Fox, *Vulpes vulpes*

One Fox was seen near Conglomerate Creek in September 1967 and droppings were occasionally found, in one case in association with the mummified remains of an *Antechinus stuartii.*

Discussion

Species present

This preliminary survey has established the presence in this area of thirteen native and four introduced species of wild mammal. Those most frequently encountered were the Ringtail Possum, Koala and Bush-rat, while Grey Kangaroo and Black Wallaby were less frequently seen. The smaller numbers of other species recorded might not adequately reflect their abundance as these are not as easily seen or caught, especially the Tuan and Sugar Glider. While it appeared that few Brushtail Possums lived in the forested area, they were quite common in the settled areas south of Riddell's Creek, towards Sunbury.

Ringtail Possums were very common in the area, much more common than in any other area surveyed by the Group, excepting only the vicinity of the Yarra River in Melbourne. No explanation can be offered for this abundance.

There was also a flourishing Koala population. This species occurs naturally here and, as Koalas are known

to move over quite large distances, the local population might have been influenced by animals that have been released in the district by the Fisheries and Wildlife Department over the years. Records of that Department show that six animals were released near Macedon in May 1931, twenty-five at Toolern Vale in November 1943, forty-six in the Black Forest in November 1952 and twenty-three at Hanging Rock in June 1957.

Had the survey programme been prolonged or extended into other parts of the hills, other species, not recorded in these surveys, might have been found.

Previous records of mammals

A useful though incomplete record of the mammals occurring in the region between 1846 and 1900 has been given by Batey (1907). From this account it is possible to see some of the changes that have resulted from 125 years of European occupation.

Batey lists the following mammals present—

Water-rat, Dingo, Tuan, Fat-tailed Dunnart, Swainson's Phascogale, Quoll, Tiger-cat, Bandicoot (species not indicated but probably *Isoodon obesulus*), Koala, Brushtail Possum, Ringtail Possum, Sugar Glider, Greater Glider, Wombat, Platypus, kangaroo and wallaby. Of these, four species, Dingo, Quoll, Tiger-cat and Bandicoot were reported to be extinct, or nearly so, in the area prior to 1907. Tuan, Swainson's Phascogale, Sugar Glider, Ringtail Possum, Greater Glider, kangaroo and wallaby were listed as uncommon, while only the Water-rat, Wombat, Platypus and Brushtail Possum were considered common, although the latter species underwent considerable population variation due to hunting by man. Batey stated that "owing probably to the visits of the Aboriginals, this animal was not plentiful in the early days, but when they ceased to visit the district, about 1851, Opossums became numerous. Later, when the demand for their skins set in, they became nearly extinct. Of late years they have again increased . . ."

The present survey did not encounter eight of the species listed by Batey — Water-rat, Dingo, Quoll, Tiger-cat, Bandicoot, Swainson's Phascogale, Greater Glider and Wombat. The last three species are known to occur around Mt. Macedon at present, outside the area of this survey, but the first four probably no longer exist here. It is strange that Batey did not record Echidna for this species is now apparently common in the district.

Nature of the habitat

Detailed examination of the vegetation showed that a great variety of plant species was present in the hill country, although the vegetation pattern has been considerably altered since white settlement. J. Frankenberg (personal communication), considers that changes in the forest have been more in structure than in composition. Timber extraction and clearing for farmland have altered the overall tree height and density and that of the undergrowth, and have produced a characteristic young forest. However, the forest still supports a wide variety of arboreal mammals, unlike the superficially similar northern end of the Lerderderg Valley, where recent surveys have shown a very sparse population. This variation is possibly due to the lack of intensive forest management in the Riddell hill country compared with that in the Lerderderg Valley. The variety and numbers of mammals encountered in the

Riddell hills show that this habitat is such that it has enabled a relatively rich fauna to survive.

The effects of drought

Quite large differences are evident in the numbers of certain species recorded at the beginning of the drought in October 1967 and late in the following spring, in the results of surveys 2a and 2b. Approximately half as many Ringtail Possums and Bush-rats and twice as many Koala were recorded after the drought as before. However, in order to assess the significance of these differences it is necessary to know what seasonal variation in apparent numbers can be expected in normal conditions and how accurate our survey methods are. As we have no data on the normal variation in numbers of the species reported in these surveys it is difficult to attach significance to the differences seen.

In addition, the interpretation of the quantitative results of these surveys suffers a further handicap in that the "efficiency" of both spotlighting and trapping methods (that is, the accuracy with which these techniques sample the actual population of animals) is not known and must certainly differ for different species. The lower this efficiency, the less sensitive are such techniques in detecting a change in population. Thus, it is not at present possible to deduce from the differences found, what changes in true population had occurred. The drought certainly did not appear to have such severe effect on the animal population that it could not easily recover.

Comment

The pressure of peri-urban residential development is now being felt in this area as a result especially of the building of Tullamarine Airport. The evidence gathered in these preliminary surveys is sufficient to warrant serious consideration being given to retaining at least a substantial portion of the area as a faunal reserve. While none of the thirteen native species recorded in this survey is unique to the area or, indeed, is particularly uncommon elsewhere in the State, their continued presence so close to Melbourne will depend only on the provision of some form of protection.

Acknowledgements

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Appendix

Detailed description of the vegetation of the areas selected for sample surveys

(For these descriptions we are greatly indebted to Judith Frankenberg, D. Ashton and N. Scarlett).

Survey 1:

The vegetation here was open forest predominantly of *Eucalyptus obliqua,* 50 ft. high on the lower slopes and 30-40 ft. on the ridges, accompanied by *E. dives* on the upper slopes and *E. viminalis* on the lower. The forest had been heavily cut in the past and was of uneven age, with frequent gaps. It was last burnt in 1962 and had a sparse shrub layer, largely comprised of saplings of *Acacia mearnsii* with occasional *A. verticillata* and small, heavily grazed *Bursaria spinosa* and *Pultenaea daphnoides.* Trees of *A. mearnsii,* 30 ft. high, were scattered along the creek bed. The ground surface was stony with frequent rock outcrops. The ground cover was grassy, dominated by *Poa australis,* with numerous herbs, scattered *Pteridium esculentum* and occasional clumps of *Gahnia radula.* On the western aspect the ground cover was nearly 80% but was much more sparse on the east-facing slopes.

Surveys 2a and 2b:

The vegetation of this area can be divided into three categories; the creek banks and adjacent flats, the hill slopes of southerly aspect and those of northerly aspect.

The creek bank and flats carried a layered open forest (up to 100 ft. in height) of *E. viminalis* and *E. obliqua* with occasional *E. radiata.* A low tree layer (to 40 ft.) of *A. dealbata* and *A. melanoxylon* was present beneath the eucalypt canopy, with a dense tall shrub layer (to 15 ft.) dominated by *Pomaderris racemosa* and *Acacia verticillata.* Shrubs such as *Pultenaea angustifolia* and *Bursaria spinosa* were occasional components of the tall shrub stratum. The ground stratum was dominated by dense tussocks of *Poa australis,* associated with species such as *Asperula scoparia, Hydrocotyle hirta, Viola hederacea, Acaena anserinifolia,* and *Adiantum aethiopicum. Pteridium esculentum, Blechnum nudum* and species of *Gahnia* and *Lepidosperma* formed a field layer in some areas. Climbing plants commonly extended from the ground stratum into the tall shrub canopy, the most prominent of these being *Tetrarrhena juncea* and *Clematis aristata.* Near the banks of the creek the ground stratum differed slightly, with such species as *Mentha* sp., *Senecio australis* and *Lomandra longifolia* becoming more prominent.

The hillsides of southerly aspect were covered, on the lower slopes,

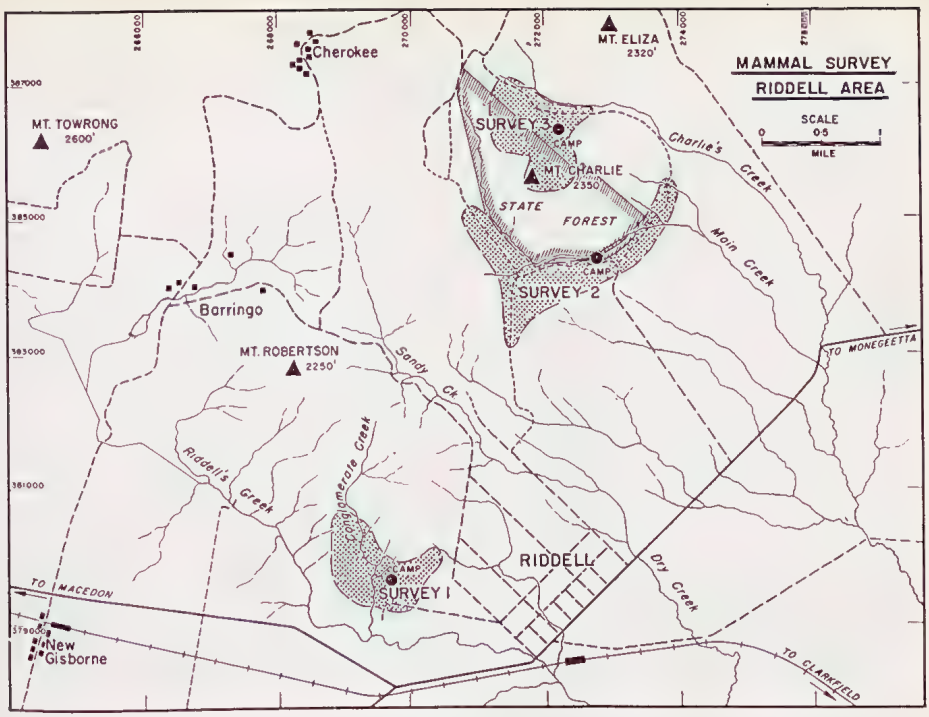

Fig. 1.

by grassy, open forest of *E. obliqua* and *E. radiata* with occasional *E. viminalis* growing to 60-70 ft. The ground stratum contained grasses and dicotyledenous herbs with a discontinuous field layer of *Pteridium esculentum.*

It was dominated by tussocks of *Poa australis* associated with plants such as *Viola hederacea, Dichopogon strictus, Asperula scoparia, Geranium pilosum, Lagenophora stipitata, Adiantum aethiopicum* and infrequently, *Danthonia pallida.* On the upper slopes the forest consisted of *E. obliqua, E. radiata* and *E. cephalocarpa* reaching a height of 50-60 ft. In the open shrub layer (6-8 ft.), *Xanthorrhoea australis* was associated with scattered, medium to low shrubs, mainly *Acrotriche serrulata, A. prostrata* and *Daviesia corymbosa,* with rare occurrence of *Banksia marginata* and *Hakea sericea.* The ground was dominated by tussocks of *Danthonia pallida* and *Poa australis,* with other smaller shrubs such as *Drosera auriculata, Opercularia varia, Lomandra filiformis* and *Veronica calycina. Pteridium esculentum* was occasional over the whole area.

The hillsides of northerly aspect carried, on their lower slopes, layered woodland and open forest (50-60 ft. high) of *E. obliqua* and *E. cephalocarpa* with occasional *E. radiata* and E. dives. The understorey of this community was variable in density. On some sites there was a dense tall shrub layer (to 10 ft. in height) of *Hakea sericea* with a low shrub layer of sclerophyllous shrubs such as *Achrotriche serrulata, Epacris impressa* and *Platylobium formosum,* associated with tussock grasses and other herbaceous plants. On other sites the shrub stratum was less dense and herbaceous plants correspondingly denser. The herbaceous

stratum on these slopes were very similar to that of the *E. obliqua-E. radiata-E. cephalocarpa* association on the middle and upper slopes of southerly aspect.

There was a gradual change from the lower to the upper slopes, the latter carrying a sclerophyll woodland of *E. dives* and *E. cephalocarpa* to a height of 35 to more than 50 ft., with a medium shrub layer (4-5 ft.) of *Hakea sericea* and *Banksia marginata*. Low shrubs were prominent and included *Xanthorrhoea australis, Pultenaea humilis, P. gunni, Epacris impressa, Hovea heterophylla* and *Platylobium formosum*. The herbaceous stratum was dominated by *Danthonia pallida* and scattered *Poa australis* and was often well developed (up to 70% cover). Associated herbs included *Haloragis tetragyna, Drosera auriculata, Lomandra longifolia* aff. and *Craspedia uniflora*.

A comprehensive species list with its ecological associations for this site is lodged in the Mammal Survey Group records.

Survey 3:

The vegetation of this area, on the northern slopes of Mt. Charlie, was very different from that of both previous surveys. Here the forest was, for the most part, very sparse *E. obliqua* with less than 1% canopy cover. There were a few thickets of very young *Acacia dealbata* (to 8 ft.) many *Xanthorrhoea australis* (some in seed) and some *Pteridium esculentum*. Ground cover was sparse (less than 5%) consisting of scattered small tussocks of dry grass and occasional clumps of sedge. The area had been severely burnt 2 years previously. The forest became more dense on the upper rocky slopes (the northern face of Mt. Charlie) with correspondingly thinner ground cover.

An Unusual Bridge Support

by Mary Turner Shaw

About 1848 a bridge was built over the Mount Emu Creek, in the Western District, its timbers being carried in the wide fork of a large river red gum. It was probably built mainly for the Rev. William Hamilton, first Minister of "the Western Church" (for a time the only church between Colac and Warrnambool, but long since crumbled and gone), so that he could easily ride across to the far reaches of his enormous parish. It also served the nearby homestead of the station which lay on both sides of the creek. Von Guerard's drawing of it is dated 1857.

In my own childhood, before the first World War, the bridge was still in daily use. My father, I remember, had it re-timbered, and at that time the two grey, iron-hard ends of the branched trunk were sawn back further, and rather inelegantly sheeted with iron to keep out rain and decay.

In 1939 a bad bush-fire which destroyed many of the older station buildings also burnt out the bridge. Revisiting my one-time home in March of this year—1970—I found only the broad, charred stump of the great old tree remaining, but marvelled to see that from its base have sprung long, thin branches, tufted with green leaves.

I do not know what is the life expectancy of a river red gum, but surely this is an unusual example of toughness and longevity; possibly even a happy augury for the continued survival of nature over the various assaults of man.

Konstantin Cyril Halafoff

The death on 24 April, 1969 of Konstantin Cyril Halafoff brought an end to the career of one of our most colourful and gifted personalities. There are not many who, in the course of a lifetime, have encompassed so many varied activities and achievements.

As we knew him in this country during the past fifteen years, he was a kindly man who gave the impression of having only two principal interests in life, namely, to protect the lyrebird and to seek peace in the solitude of the forest. Perhaps these interests were a form of distractive behaviour, because his early training and interests lay in very different spheres.

K. C. Halafoff was born on 2 April, 1902 in Moscow and may be said to have belonged to the Russian liberal intelligentsia. Following teaching by private tutors he went on to high school, whilst taking private tuition in the piano. It was his early intention to become a concert pianist and a composer. Even as a teenager, he had some poetry published.

But fate was shaping his destiny in a different mould and, at the age of 17, he joined the White Russian Army in its fight against the Bolshevists. After the defeat of the White Russians he was evacuated to Constantinople and later to Yugoslavia.

Here life began anew, and he started high school at the age of twenty. From high school he went on to the University of Belgrade, where in 1931 he graduated with honours in Civil Engineering. He was retained by the University as an Assistant Professor. Here he met and married a student in architecture who was also a Russian of White Army background.

His interests linked him with Russian emigre anti-communist organizations, but he found time to write a number of poems which were published.

Perhaps the added responsibilities of marriage caused a minor pause in his wide-ranging interests and he joined the Yugoslavian Government Railways where he was employed from 1932 to 1939 as a structural design engineer. In this capacity he became one of the country's experts on steel bridge construction.

He had left Russia nearly twenty years earlier in quest of peace, but in 1939 was again enmeshed in the web of fate. He joined the Yugoslav army in its war with Germany. Before long, alas, he was in the hands of the Germans, who sought to utilize his professional skills as an engineer. He was moved towards the Hungarian border, but as the Soviet Army advanced through the Balkans, he decided to endeavour to get away even at the risk of German forced labour camps, lest he fall into the hands of the Russians, for fear that his anti-Soviet activities might be too well remembered. His aim was eventually to reach the British- or American-occupied area.

He joined a refugee train bound for Austria . . . and somehow managed to take his family with him. When his disappearance was discovered, he was sentenced to be shot by the Germans for desertion; but, with the ingenuity of a Scarlet Pimpernel, managed to avoid identification in the chaos of the German forced labour camps in Austria. He was eventually "liberated" by the Americans, but not before he had made another escape from the

advancing Soviet Army, this time on foot in the middle of Winter.

So this Russian who had established himself in Yugoslavia now entered a new phase of his life and, after studying English in a Displaced Persons' Camp, became an interpreter to British and American missions in a Resettlement Camp in West Germany.

In 1949 he migrated to Australia with his family and, until his retirement 18 years later, was employed by the Country Roads Board as a design engineer in the Bridge Division. During this period he was associated with the design of many road bridges throughout Victoria and, in particular, the strengthening of the Chandler Highway Bridge over the Yarra River and the Glenelg River Bridge at Nelson.

Happily, his wife, who was a qualified architect, was also employed by the Board which was thus enabled to play an important part in the further development of this talented husband-and-wife partnership.

Freed from the stresses and strains to which he had been subjected in Europe, he now entered a new phase of his life which was perhaps his most rewarding and happiest period. It almost seemed as if, all his life, he had been searching for truth, and he found inspiration among the tall mountain ash and fern gullies of Sherbrooke Forest. His love of peace and his early training as a musician, his fine feelings as a poet, and the anguish of the years before, had conditioned him for a warm spiritual response to the charms of Sherbrooke. Before long he had met and, in his own words, fallen in love with Sherbrooke's lyrebirds. As the years passed, he became greatly attached to "Spotty," without doubt, Sherbrooke's most celebrated lyrebird.

But K. C. Halafoff was not content merely to observe, however enjoyable he found this experience. Before long, his fertile, highly trained mind was asking questions about the nature of the lyrebird's song and he began to apply in a most ingenious manner his training as a musician and engineer to the analysis of the lyrebird's song. His researches on this subject were penetrating and covered a wide field, and brought a harvest of scientific papers on this subject which will always stand as a monument to his brilliant intellect. He did not work in a vacuum and, in the course of his researches, collaborated with the world's leaders in the field of bird-song analysis, thereby focusing the attention of overseas scientists on the lyrebird—Australia's No. 1 song-bird.

His publications in the Victorian Naturalist dealing with this subject comprise a heritage of scientific achievement in a virgin field, for no-one had attempted this work previously. As he says in one of his papers, it was fortunate "that a full realization of the musical value of bird song and subsequent attempt to analyse its musical properties have come so late—on the heels of magnetic tape and electronic devices which only recently have made it possible to record authentic bird song with all its minute details — tremolos, rapid glissandos, trills and other adornments in which it abounds. Had that analytic work started earlier, on the basis of field notes, all of it would have had to be scrapped now." Whilst agreeing, we can also add, how fortunate it was for us all that K. C. Halafoff "happened along" at the right mom-

ent and realised that there was an opportunity for scientific study in what to others had been a transient interest.

Among his other interests was the making of a movie film on the lyrebird, in colour, a task of no small magnitude for him, depending as he did on natural light in a dense forest. In this work, too, he displayed typical pertinacity and produced an excellent film which won acclaim at home and abroad. He also collaborated with Mr. Peter Bruce in the making of a record of the lyrebird's song, which was produced in the United States.

But Halafoff will be remembered not only for his scientific achievements. Everybody who has read his papers, and especially the one entitled "Lyrebirds of Sherbrooke" (Vic. Nat., March 1958, Vol. 74, p. 157) will have been moved by his mastery of the English language. He played it as he would his beloved piano and the result is a treasury of English literature. He had the sensitivity to hear the inner voice of the forest and the talent to interpret its message and convey it to his fellow men.

Unfortunately, failing health forced his retirement in 1967, but his intellect never faltered and he turned to a number of musical compositions, mainly a suite dedicated to J. R. R. Tolkien, based on the latter's trilogy "the Lord of the Rings." He finally succumbed to a heart attack in April, 1969.

K. C. Halafoff has gone, but his good works remain for posterity and us. No longer will he be seen quietly sitting on a fallen monarch in Sherbrooke Forest, listening intently to the song of the forest, nor will he be heard urging his fellow men to greater efforts to preserve his precious lyrebirds; but the memories of these events will not soon fade.

Those who knew him will remember him as a vigorous champion of the weaker elements of society and nature which stood in need of protection and as a kindly man whose anger was roused only by some unkind act against those things which could not protect themselves. His scientific works, his poetry, his literature and his example are a valued part of our heritage. He was never content to give anything but his best and his best was superlatively good. Truly, it may be said that Konstantin Cyril Halafoff did not live in vain.

L. H. Smith

Geology Group Excursions

Sunday, 5 July—To Cave Hill (Lilydale) Limestone Quarry. Leader: Mr. J. Dobson.

Sunday, 9 August—To Heathcote. Leader: Mr. R. Davidson.

Saturday, 5 September—To Eden Park Fossil beds. Leader: Mr. Barry Cooper. Leave Lalor Railway Station at 2.10 p.m.

Sunday, 11 October—M.M.B.W. Trunk Sewer Tunnel. Leader: Mr. Kerry Hammond. Limited to party of 20—booked out. No further applications can be accepted.

Sunday, 8 November—King Lake. Leader: Mr. George Carlos.

Transport is by private car (spare seats are usually available to those without their own transport). **Unless otherwise indicated** excursions leave from the western end of Flinders Street Station opposite the C.T.A. Building at 9.30 a.m.

Field Naturalists Club of Victoria

General Meeting

8 June, 1970

The meeting was opened by Mr. T. Sault, the President, with approximately 120 members and visitors present. A welcome was extended to new members, particularly Mr. and Mrs. R. Garrett, from South Australia, who were present.

Mr. Sault informed the meeting that the Public Address system had been overhauled and invited comment from the audience as to whether the acoustics were improved. Sound tests conducted in the Hall will be referred to the Council for further consideration.

Exhibits:

A varied selection was tabled and created interest and discussion.

Mr. T. Sault—A brown variety of Common Vegetable Bug (*Nezara viridula*), 2 ground-dwelling spiders common to the Mornington Peninsula (unidentified), a specimen of the Twiggy Daisy-Bush (*Olearia ramulosa*) found growing in sand at Gunnamatta Beach, and under the microscope fossil shells (Foraminifera) from Balcombe Bay.

Mr. Barry Cooper — Fossil shells (Brachiopods) in Devonian rocks collected at Grants Road, near Woodstock, Victoria.

Mrs. North—A collection of polished agates from Lymington Beach, Cygnet, Tasmania.

Mr. Haase—A garden grown N.S.W. Waratah (*Telopea speciosissima*).

Mr. R. McGavin—A Fungus (*Tricholoma spp.*) from the Lower Kinglake area.

Mr. D. McInnes—A specimen of basalt showing zeolite crystals, collected on the geology excursion to the Footscray Quarry. He suggested that an effort be made to preserve some of the cliff faces in the quarry because of their geological value. They would eventually be lost as the quarry was now being filled with rubbish. A species of rush (*Juncus acuta*) found growing in polluted water in the quarry was also shown.

Mr. Swaby—A selection of native flora and 2 specimens—Austral Adders-Tongue (*Ophioglossum coriaceum*) and Onion Orchid (*Microtis orbicularis*), collected and preserved in 1935.

Mr. T. Sault and Mr. D. Lee were elected as F.N.C.V. delegates to attend the meeting of the Conservation Council of Victoria to be held at the Redmond Barry Building, Melbourne University on the 18th June, 1970. A motion was passed that the F.N.C.V. become a full member of the Conservation Council and the necessary fees be paid.

Mr. P. Kelly, Club Librarian, spoke on the need for more space in the Library and suggested that a number of obsolete books be removed. It was decided that a Council sub-committee be formed to select those books to be discarded, the list to be placed before the general meeting for approval.

A storage problem had also arisen regarding photographic blocks and members were asked if they could assist with space and indexing.

On behalf of the Botany Group, the President, Mr. A. Fairhall, presented a copy of Nichols "Orchids of Australia" to the Library in memory of the late Mr. Frank Zirkler.

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The subject for the evening was a film, "The Turn of the Tide" produced and presented by Mr. Ian G. Wallis, of Monash University. Mr. Wallis also spoke on the work of the Monash University Westernport Bay Research Team and outlined ways in which club members could assist with this important project.

A resume of Mr. Wallis' talk will be published as a separate article in August.

Botany Group Meeting

11 June, 1970

The subject for the evening was entitled "The Botany of Captain Cook's Australian Voyage."

Mr. J. Baines had prepared a detailed set of maps and charts, showing the places named during the voyage along the Eastern Australian coast and the places where the party landed and collected botanical specimens. As well as the charts, there was a list with the up-to-date names of the plants collected at Botany Bay. Each person at the meeting was presented with a copy of this list. The voyage further north, through the more tropical parts of Queensland was mentioned in less detail.

Cook, at some sacrifice to the comfort of his ship's personnel, had allowed Banks to join the expedition with his team of botanical workers. To equip and finance this group, Joseph Banks had used his own private means. The lecturer described the life of Banks and various members of his team of workers, dwelling especially on the life of the able Swedish botanist, Solander.

There were some extremely interesting books on view, some lent by the Herbarium Library, some from Mr. Baines' own collection.

Though Banks and Solander described the plants collected, it was later botanists who published descriptions. Hence many of the names given by these first collectors have been changed.

Several of the books contained the beautiful botanical drawings of Parkinson, whose sketches were finished, after his death on the voyage, by four other botanical artists.

The chairman thanked Mr. Baines for his unusual talk, which must have entailed an immense amount of detailed reading and research.

Geology Report

6 May, 1970

Thirteen members attended with Mr. Blackburn in the Chair. The subject for the evening was a talk by Mr. Kerry Hammond on "Basin Evolution." The speaker began by explaining that his talk was on the mechanism of Structural Geology and its relation to oil formations.

The formations of Dynamic basins, he said, resulted from a different structural mechanism to Orogenic basins such as geo-synclinal troughs, which as a rule are not oil bearing. His mention of the fact that oil basins are not concave, but convex caused considerable interest and he explained through the aid of diagrams why this is so. He then explained that when oil is occupying pore space in very porous rocks, it migrates under pressure from areas of high stress to areas of low stress which are usually on the margins of the basin. He also said that one of the present popular theories on the cause of basin structure was convection currents caused by radioactive elements deep in the earth's crust dragging down the earth's crust at regular intervals. He said that no basin or fold structure anywhere on the globe exceeded 35,000 ft. This seems to be the physical limit of any structural system. He quoted an area in the South China seas where an oil basin is at present in the process of forming. Mr. Blackburn thanked Mr. Hammond for a very interesting and informative talk.

Exhibits.

Mr. Angior—Granite with Tourmaline Crystals, Wilsons Promentory.

Mr. McInnes—Bryozoal limestone, Waurn Ponds, under microscope. Brachiopods, Waurn Ponds.

Mr. Blackburn—Fossil Kangaroo Jaw, Fossil bone fragments, Aboriginal artifacts, and Chippings. Greens Gully, Keilor.

Mr. Sault — Hypersthene-Rhyodacite, Barnewall High Plains. Cordierite-Nevadite, Eildon. Basalt, Eildon. Stibnite in Quartz, Eildon.

Marine Biology and Entomology Group

4 May, 1970

Mr. R. Condron chaired the meeting which was attended by 19 mem-

bers. An apology was received from Mr. and Mrs. Lee.

The Secretary reported that he had spoken to the Secretary of the club, Mr. D. Lee, re the taking of marine life from Ricketts Point, and that Mr. Lee had said that he would take the matter up with the local council of that area, with a view to having notices put up.

Mr. W. McInnes reported that a meeting of the Show Committee was held recently. Unfortunately Mrs. G. Lee was unable to attend.

Dr. Brian Smith will be in Queensland during the Show period, but will arrange with the Underwater Research Group to put on a display similar to that of last year. A suggestion was made that a special feature be made of land and freshwater molluscs. Mr. David Long will be able to arrange this.

The secretary read a letter from Dr. Brian Smith stating that a census of land and freshwater molluscs of Victoria was to be undertaken as a joint project between the Museum, the F.W.C.V. and various other naturalists' clubs throughout the State. Dr. Brian Smith gave a short talk on this project, stating that Mr. D. Long had been involved in a similar project in England and Ireland. He also suggested that on future outings each member be given a plastic bag or collecting bottle, and whilst engaged in other nature activities, keep a lookout for land molluscs. Necessary data re collecting details will be distributed at a future date.

Mr. McInnes suggested that one specimen of land or freshwater mollusc could be described in the F.W.C.V. Journal monthly, in order to keep the matter before the notice of members. Dr. Smith asked for assistance in keeping a record of molluscs collected. Mr. J. Strong offered to assist.

At the April Group meeting Mr. R. Condron was nominated as Chairman of the Group for the ensuing year, and Mr. J. Strong as Secretary. As there were no further nominations the above were declared duly elected.

Dr. Brian Smith announced that the next work-in at the Museum would be on Saturday, 16th May, starting at 10.30 a.m.

The secretary announced that Mrs. Zillah Lee had very kindly offered to keep the minutes while he was away for three months.

Exhibits.

Mrs. C. McInnes—some mealy bugs on fronds of a fern.

Mr. R. Condron—a drawer of butterflies of the sub-family Danainae. Mr. Condron stated that the Wanderer was a member of this family, and that this family could be traced through the Indo-Malayan region.

Miss E. Dixon—a beetle which was identified by Mr. P. Kelly as *Diaphonia dorsalis.* This specimen was taken at Northcote.

Mr. P. Kelly—a spider, *Celaenia excavata.* This spider is commonly known as the Bird-dropping Spider.

Miss L. White—Saw-fly larvae showing variation of colour.

Mr. J. Strong—a land mollusc—one of the black snails, *Victaphanta atramentaria,* collected at Powelltown. Also two small species of snails collected at Murrumbeena. Some leaf-hoppers—black with red markings on them. These were also collected at Powelltown, and were attended by ants.

Notice to Contributors

In order that editing time be kept to a minimum, articles should be preferably typewritten and double-spaced; with a 1" margin on the right. No underlining should be shown.

If handwritten, please allow a margin of 1" and write clearly.

Western Victoria Field Naturalists Clubs Association

Report on Club Activities for year 1969

(Compiled by J. Lineker, Hon. Secretary, Portland F.N.C.)

Reports from other Clubs will appear next month.

Geelong

President: Mr. J. Wheeler. Secretary: Mr. Gordon McCarthy.
Membership 400 members and subscribers. *Meets First Tuesday, McPhillimry Hall.*

Enthusiastic meetings have been held throughout the year with Junior Meetings held prior to the general meeting. Prizes for the junior projects were awarded at the end of the year. All meetings have been well attended, with 155 members and visitors in December, and a variety of speakers and subjects have been of great interest. A diversity of areas were visited on the monthly excursions, averaging 40-50 cars; and two weekend excursions to Mt. Macedon and Portland were very well patronised. A nature show was held at Freshwater Creek hall for that branch of the Victorian Farmers Union. Some 120 boys from Haileybury College, staying at Anglesea National Fitness Centre were taken on a geology excursion and given a nature evening. A number of Lady Cub Masters at Eumeralla scout camp were similarly entertained.

Tree planting in conjunction with the B.O.C. was carried out at the You Yangs and Serendip Wildlife Station. The club has joined with the local branch of the SGAP to try to reserve 200 acres of bush at Bannockburn. A survey group, by a series of 2-monthly campouts, will study areas in the Otway Ranges with a view to reservation. The high standard of the quarterly magazine *The Geelong Naturalist* has been maintained and it continues to be most popular.

Hamilton

President: Mr. Murray Gunn. Secretary: Mr. John James.
Membership: Adults 35, Junior 4. *Meets Third Thursday, Gray St. State School.*

The Club has purchased a cabinet for the herbarium, and now has 705 different species of plants filed. Mr. Cliff Beauglehole has presented many specimens and given a detailed index. During the Yulunga Festival in February the Club sponsored a natural history lecture. An exhibit of native flowers grown in members' gardens was sent to the Nature Show in Melbourne. Approximately 180 trees supplied by the Fisheries and Wildlife Department have been planted by club members at Bryans Swamp.

Horsham

President: Mr. C. O. Kroker. Secretary: Miss S. Robertson.
Membership 40. *Meets Fourth Thursday, Technical School.*

Meetings have been well attended, and natural history specimens are a regular feature. The 7-minute free choice subject talks indicate the high standard of member participation. The club has organised a yearly essay competition for Horsham Primary Schools to stimulate interest in nature study. Monthly speakers included Microbiology by Mr. R. Luff of Longerenong Agricul. College. Slide lectures 'Birds identified on a trip to Cent. Aust.' Mr. Gunn, Hamilton F.N.C. 'Birds around the world' Mr. R. Cooper, RAOU; Audio-visual 'Frogs of the Horsham District' Mr. Con Kroker, and Nature Slide Project, Mr. Schick, Horsham. Member nights, question night and screening of nature films were included in our syllabus. Excursions included fungi collection at Troopers Ck. (Grampians), inspection of the Wimmera R. in Horsham conducted by the club representative on W.R. Improvement Committee, Mrs. Jean Hill. An inspection of a swampy scrub area known as 'Nowhere Else' near Carpolac resulted in a recommendation for preservation to the Fisheries and Wildlife Dept. Another area of scrub land adjacent to the reserve forest in the Parish of Tooan was also inspected with a view to preservation. Conservation has received active support particularly the Little Desert, Lower Glenelg, and Arapiles. Negotiations with the Arapiles Shire Council for assistance in clearing the fence will push forward the project for fencing the John Smith Memorial Sanctuary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

Geology: Mr. T. SAULT.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1970

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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the VICTORIAN NATURALIST

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45 cents

Wild Flower and Nature Show

Where? The Lower Melbourne Town Hall.

When? Monday, Tuesday and Wednesday, 13, 14 and 15 September, from 10 a.m. to 10 p.m.

The above Show is prepared and staged annually by the Society for growing Australian Plants (S.G.A.P.), and by the Field Naturalists Club of Victoria (F.N.C.V.).

Through this comprehensive exhibition we hope to create in the general public a greater awareness of the wealth of interest and enjoyment to be gained from a knowledge of our remaining bushland and beaches, and a greater concern to preserve as much as possible of what remains both for the present and for the future.

To this end the Bird Observers Club is staging, as the main exhibit, two dioramas depicting —

(a) birds in their natural habitat, and

(b) what can happen to them in a polluted environment.

The 1970 pamphlet will tell the story of the Fairy Penguins of Phillip Island fame.

The wild flowers, from all Australian States, displayed by the S.G.A.P., are all garden grown, and these successful growers will be very happy to pass on any hints on their culture and availability to any "would-be" growers.

Another colourful exhibit will be a display of native flowers from the Maranoa Gardens, Balwyn.

The Hawthorn Junior Field Naturalists are again showing how varied their interests are. One exhibit features "Fossils found around Melbourne," and another will show minerals under fluorescent lighting, while a third is an Ant Farm. A fourth activity will demonstrate methods used in collecting pond-life.

The Entomological and Marine-life Group will display pond-life in aquarium tanks.

The Preston and Montmorency Junior Field Naturalists are also preparing exhibits.

Captain Cook's voyage along the Eastern coast of Australia in 1770 has provided the themes for both the Botany and the Geology Groups. The former is featuring plants collected by Sir Joseph Banks (then Mr. Joseph Banks), and by Dr. Solander. Some reproductions of illustrations begun by Sydney Parkinson will also be shown.

The members of the Microscopical Group will bring to our notice some of the very interesting things we cannot see with the unaided eye. They will also show methods used in preparing plant exhibits for examination, as well as views of microscopical objects projected on a screen.

As usual one of the exhibits — popular with children — will be live snakes, lizards and frogs.

Last, but not least, from the children's viewpoint, will be the frequent free showing of Nature Films kindly lent by the State Film Centre.

Books and publications on natural history subjects will be available for sale on a Publications Stand. Here one may also obtain information relative to the F.N.C.V.

ADMISSION — Children 10 cents, Adults 30 cents. Continued p. 242

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: E. King

F.N.C.V.

Vol. 87, No. 8 6 August, 1970

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Front Cover:

How many of us are familiar with the reptiles of Victoria? The gecko shown here is the forerunner of an illustrated series by Hans Beste, which is to be published soon.

A Blue Bottle in the Sub-Antarctic

by

WILLIAM MERILEES*

Half the enjoyment gained from walking the tide line is the anticipation of what will turn up. Even when I was stationed in the sub-antarctic at Macquarie Island in 1967, this fascination provided great enjoyment, although the accumulated flotsam had nowhere near the variety of an Australian shore. Pumice, from the South Sandwich Island volcanic eruption in 1962, was everywhere; large glass buoys from Japanese pelagic fishing operations were picked up on occasion, even one metal navigation buoy from the African coast was located. Aside from these were the usual assortment of seaweeds; red, brown and green, and many other marine organisms, notably molluscs and fish and a few large crustaceans. One of the most unexpected finds was one Blue Bottle or Portuguese Man o' War *Physalia utriculus*.

Portuguese Man o' war (*Physalia utriculus*) in waters with a Gentoo Penguin (*Pygoscelis papua*).

During my exploration of Australian beaches, primarily those near Wollongong, New South Wales, many hundreds of Blue Bottles were found beach-washed and brittle. Having spent much of my earlier beachcombing on Canada's West Coast, I was somewhat surprised by this occurrence as I had always considered this species to have a much more tropical distribution. I suppose this was just another of those misconceptions which plague a foreign student of biology who has not been able to gather his facts from first hand observation. However, I quickly accepted the fact of Blue Bottles in New South Wales.

Imagine my surprise some months later when I collected one individual of this species at Macquarie Island, 1,400 miles further south!

This specimen is now in the collection of the South Australian Museum, Adelaide, number A1043, and extends the southerly limit of

*Biology Dept., Selkirk College, Castlegar, B.C., Canada.

known distribution of this species by 650 miles to 54° 30′ South latitude.

As *Physalia* is a slave to the winds and ocean currents, this occurrence ought not to be considered as unusual as might at first be thought, although to my knowledge this species has not been found at Macquarie Island before.

In discussing the range of this species Shirshov (1969) mentions that insufficient information is available to provide a complete picture of this species' distribution. However, he gives Totton's (1960) reference of 45° 11′ S, in the vicinity of Tasmania, as the most southerly record.

Macquarie Island is in the belt of strong prevailing north-westerly winds often referred to as the 'roaring forties.' For this reason many pelagic species or sedentary species attached to floating objects are likely to drift on to the island's western beaches. Dell (1964) mentions the limpet *Nacella kerguelensis* as one such species and the goose-necked barnacle *Lepas australias* as another. The latter is perhaps one of the best examples of this type of travel. Both these species have only been found on beach-washed material, notably kelp in the case of the limpet, and wood, pumice and feathers in the case of the barnacle.

Since the prevailing winds at Macquarie Island are from the north-west, it suggests that the Blue Bottle mentioned probably originated from the seas adjacent south-eastern Tasmania or Australia. This is also the same general area where the previous most southerly record for this species was recorded.

The appearance of this "tropical" animal at Macquarie Island is both interesting and educational, pointing out the great influence that winds have on the distribution of this species. It also proves the contention mentioned in the opening remarks that one never knows what will be encountered when one walks the tide line of an ocean beach.

Acknowledgements:

The author wishes to thank Dr. R. V. Southcott of the South Australian Museum for confirming the identity of the specimen and Harry Kalmakoff, Department of Modern Languages, Selkirk College for translating the article by Dr. Shirshov. Thanks are also extended to Robert Burn for his kind help in preparing this article.

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Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V. Treasurer, Mr. D. McInnes.

A 'little' Little Desert near Cranbourne, Victoria

by Victor Jacobs

When I heard a news item that some land in the Cranbourne district had been allocated for an extension of the Royal Botanic Gardens, I was interested but didn't pursue the matter.

When Norman Beaumont later invited me to walk over the area, I was eager to go. Norman had done some valuable spade work by visiting the Cranbourne Shire Offices, and producing a letter from Robert Dunstan M.L.A., Member for Dromana, dated 16 February 1970, and addressed to Mr. Grant, the Shire Secretary.

In essence, the letter is as follows—

". . . an agreement by the Premier to purchase land at Cranbourne for an annexe to the Royal Botanic Gardens.

The site will provide an Australian native plants botanic garden, and will also be used to initiate research into the improvement of Australian native plants for horticultural purposes.

The site concerned is allotment 22a, Shire of Cranbourne, just south of the Cranbourne Racecourse. It consists of approximately 396 acres.

To the north is a low-lying area of open swampy country with black sandy soil partly covered with Messmate, Peppermint, Tea Tree and Sword Grass, whilst to the south is an elevated undulating area some 100 feet above the northern area containing Messmate, Peppermint and Paper Barks in the valleys. It is proposed that development will occur in two stages:

(A) A holding period of approximately five years during which the area will be maintained in its natural state with special attention being given to fire protection, vandal control, maintenance of fences and general caretaking. During this period a limited development of nature trails will take place. A botanical survey of the whole area will be made by the National herbarium and the Universities of Melbourne and Monash; together with the preparation of broad landscape plans for the second stage of the project.

(B) Development:

(i) The establishment of an Australian native plant botanic garden of up to 100 acres as annexe to the Royal Botanic Gardens in Melbourne, using native plants suitable for horticultural purposes.

(ii) The establishment of a research area of approximately 10 acres where selection and breeding of native plants may be conducted.

(iii) To retain in its natural condition an area of approximately 300 acres of natural Cranbourne heathland with admission only through nature trails."

Norman and I, armed with camera, vasculum and etceteras, headed towards Cranbourne, but not directly to the proposed annexe (1; Fig. 1), but to three smaller areas of Natural History value (2, 3, 4; Fig. 1).

Site 2 is a fenced area of about 25 square yards in the Cranbourne Cemetery. It was fenced to protect the Large Duck Orchids that grow there. The fence is in good condition. As we returned to the cemetery gate we saw good examples of Spike Acacia.

We headed south along the South Gippsland Highway, and just past the South-east corner of the racecourse we saw a rather weathered notice, Bushland Sanctuary (3; Fig. 1). Some large Swamp Gums were hosts to Yellow-winged Honeyeaters and the thick Tea Tree is in a healthy state.

Continuing South we came to the Wildflower Sanctuary on the corner of the Highway and Hastings Road (4; Fig. 1). This area was also reserved for the Duck Orchid and measures

about 3 square chains. We noticed plenty of Common Cassinia, Wild Cherry, and the brown remains of an Umbellifer, Trachymene anisocarpa.

Later, investigations into the originators of the scheme to reserve these areas, first led Norman to Colin Lewis, Clerk of Courts, Dandenong; and then myself to Jim Willis and Miss Winifred Waddell O.B.E. When I rang Miss Waddell, who is nearly 86,* I wondered if she would remember her past efforts, but the crisp and vigorous voice was well matched by her memory. She and Miss Nola Burke found the Duck Orchids in the cemetery, and what is now the Wildflower Sanctuary. In the latter, Spider Orchids, Nodding Greenhoods and Sun Orchids were found too. When I asked why the Bushland Sanctuary was reserved, she replied — "It's a good piece of bush."

No wonder those determined ladies were the prime movers in persuading the C.R.B. to fence the areas. Both parties are to be congratulated. Local naturalists with spare time would find it extremely rewarding to survey these areas in detail over a whole year.

Having dealt with the first part of our plan, we backtracked a few yards to where the Bullarto Road crosses the highway, and turned left to head west. As soon as we had turned the next corner to head south we were following the eastern boundary of the Royal Botanic Gardens Annexe (1; Fig. 1).

A stretch of low vegetation backed by trees was punctuated by yellow spots which I suspected was *Melaleuca squarrosa* but only proved it as such after a fierce tussle to reach it through a tangle of sword grass and tea tree.

On the south-east corner a gate barred our progress by car. Here a large Manna Gum (*Eucalyptus viminalis* var. *racemosa*) scented the air with honey and swarmed with bees and other insects. An Imperial White Butterfly fed at the large blooms, while ants scurried backwards and forwards from the scale insects.

Traversing the gate we headed west until the yellow face of a recently worked sand pit almost hung over us, and there, opposite an open shed was a gate. We passed over this gate and followed the sandy virgin track that led to the trig. point, the highest in the area. As we walked along I had the distinct impression that I was in the mallee. Yes! Even in Wyperfeld. Admittedly the mallee scrub was absent, but the sandy unused tracks with the regeneration so obvious was reminiscent of other tracks recently trodden, only those were so much more remote that it seems incredible that such an untouched area should still remain so near to our extending metropolis.

After a quarter of a mile we descended from the track on the ridge, forcing our way past the fine leaves and obstructing branches of the tea tree, and then through the scented leaves of the paperbark to the open swamp. A strange area this, with the black rectangular peaty blocks of soil separated from each other by wide trenches still containing water and hurriedly leaping frogs. The dominant plant was Yellow Marsh-flower and the former yellow flowers had been superceded by drying leaves stems and full seed containers. One wonders how an area like this developed. No doubt the summer dry would produce small cracks very quickly, and if the area never holds deep water these cracks would be perpetuated and extended into their present size.

While we were in this hollow, Yellow-winged Honeyeaters and White-cheeked Honeyeaters called often.

We regained the track and followed it through the low tea tree thickets

* Miss Waddell is still an active member of the Native Plants Preservation Society, and also a Secretary for Established Sancturaries.

and Dwarf Sheoke heavily festooned with ornamental cones. As we climbed to the higher ground, banksias in flower appeared, and the ground was thickly covered with Flat Peas. More and more specimens of Spike Acacia were seen and the advanced buds on one specimen left no doubt as to the rod shape of its flower head. A few yards from the trig. point a sandy bank, had scattered over it many ground hugging plants. One, a white heath was in flower. Looking at these few square yards we remarked what a valuable aquisition the area was from a natural point of view, and what an opportunity exists for growing plants from other states.

We had reached the trig. point, and in spite of a haze on this very warm autumn day, appreciated the 360° panorama that was ours. To the north the ramparts of the Dandenongs, to the south-east a dark patch of mangroves marked Tooradin, and both Western Port and Port Philip Bays were easily located.

We retraced our steps finding a large section with Horny Cone Bush and some dried spikes on a few small Grass-trees. A very young Grey Fantail crossed the track. The next tree contained some White-naped Honeyeaters, and the next a flock of Striated Thornbills. There was plenty of everything for the observer but time.

So we left our "little" Little Desert, having seen but a mere fraction of the botanical and ornithological items of interest; although hoping to have implanted the seeds of interest in others, and equally as important, having spread the news of this valuable acquisition.

Figure 1
(see text)

Important Meeting at Heidelberg.

At Heidelberg Town Hall, on Friday, 28 August, at 8 p.m., a public meeting will be held, to which an invitation to attend is extended to all people interested in the past history and the preservation and conservation of the Yarra valley.

It is vital that a strong and authoritative organisation should be formed to advise on the future of this important area which is already endangered by "progress".

Notes on the Glider-possum, *Petaurus australis* (Phalangeridae, Marsupialia)

By N. A. Wakefield*

Introduction

The subject of this article is the largest of the three glider-possums which comprise the genus *Petaurus*. Troughton (1941) and others followed Thomas (1888) in placing this genus in the subfamily Phalangerinae of the family Phalangeridae, but Ride (1970) includes it in a separate family, the Petauridae.

In members of the genus *Petaurus*, the gliding membrane extends out to the ankle of the hind-limb and to the hand of the fore-limb (See Figure 1.) The tail is clothed with very long fine fur. The head-body length of *P. australis* averages approximately 11½ inches (29 cm.) and the tail is approximately 18 inches (46 cm.) long. The ears are large and long, with the apical portion bare of fur both outside and inside.

Coloration

In some specimens the body colour is silver-grey, merging to black on head, limbs, centre of back (longitudinally) and the apical two-thirds of the tail, while the underparts are creamy-white. (See Figures 3 and 6.) In others there is a general infusion of dull yellow, so that the darker colours become brownish and the light underparts are quite yellowish. Thomas (1888) credited the species with rich brown coloration above and orange or cream beneath, and he subsequently proposed a new subspecies, *P. australis reginae* (Thomas 1923) based on a Queensland specimen (female) with paler coloration. Troughton (1941) suggested that the creamy-white under-colour may be characteristic of the females and young males. However, series of skins, in the National Museum of Victoria, from widely separated parts of the State, demonstrate that the differences in colour represent normal individual variation, and that the extremes may occur in members of any population and in either sex. Paler specimens of Victorian populations have precisely the coloration attributed to the subspecies *reginae*.

Vernacular Names

The vernacular, Yellow-bellied Flying Phalanger, used by Thomas (1888) and Le Souef and Burrell (1926), was modified to Yellow-bellied Glider by Troughton (1941). Fleay (1947), recognizing that a large proportion of individuals were not yellow-bellied, proposed the name Fluffy Glider for the species, but this has not found favour with naturalists. Calaby (1966) called it Dusky Glider, and that is a most appropriate descriptive name. The matter is confused, however, for Fleay (1947) proposed that Dusky Glider should replace Greater Glider for *Schoinobates volans*. That was rather unfortunate, as the very common black and white phase of *Schoinobates* is not at all dusky. In the long-term view it seems desirable to retain Greater Glider for *Schoinobates* and to adopt Dusky Glider for *Petaurus australis*.

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Voice

In recording his experiences with *Petaurus australis* in the Mount Wills area, Fleay (1933a) noted that "each time the animal took off, a low, but unmistakable, whirring moan was uttered, . . . and several times before volplaning it uttered a fairly loud shriek". The shriek is translated later as "cha-roo-ka".

Actually, the very loud "cha-roo-ka" is uttered from time to time by a stationary feeding animal or by one climbing about on the trunk or limbs of a tree. Often, when uttered by one glider, the call is answered by another glider a considerable distance away. The whirring moan is a continuous deep-toned humming note which is invariably uttered during the first one or two seconds of each glide. In the majority of cases, but by no means always, the humming note is followed by a gurgling cry which rises and falls rapidly in both pitch and volume and is maintained throughout the glide. Almost invariably, too, the glider utters the loud "cha-roo-ka" immediately upon landing at the end of its glide.

Both the gliding cry and the loud shriek are audible to the human ear at distances of several hundred yards, and the range is probably greater for the keener hearing of the animals themselves. The calling behaviour is evidently an adaptation enabling pairs of gliders to maintain contact while foraging and moving about the countryside, especially when a change is involved to a different area and home tree.

One of the most remarkable features of our local mammal literature is that the Greater Glider, *Schoinobates volans,* has been credited with the voice of *Petaurus australis.* Fleay (1933a) believed that the Mount Wills animals were the first living examples of *P. australis* that he had seen, and he commented that the "fairly loud shriek" they uttered, "though not as piercing" as that which he associated with *Schoinobates,* "resembled it very closely". Further, in writing of *Schoinobates* (under the synonym *Petauroides*), Fleay (1933b) commented:

> The loud gurgling shriek rises sharply up the scale followed by a series of bubbling sounds, and the call appears to be uttered while the marsupials are moving actively and indulging in gliding flights. There is an extraordinary similarity between the call of *Petaurus australis* . . . and of *Petauroides.* Strange to say, however, though members of the latter genus appear to accept captive conditions fairly happily, I cannot recall ever having heard them utter a shriek in these circumstances. In the Beaconsfield bush the animals are specially noisy in the winter months.

Subsequently, Fleay (1947) stated that the call of *Schoinobates* is "a sustained gurgling cry accelerating rapidly as it diminishes in volume", and that the call of *Petaurus australis* "begins with a piercing shriek immediately followed by a more deliberate, scolding, bubbling call of varied inflections". At the same time, he noted that, following the Mount Wills observations in 1933, he realized that he had previously heard the cries of *P. australis* at Upper Beaconsfield, Kinglake and far-eastern Victoria, but had imagined them to come from *Schoinobates.*

Following close observation of both *Petaurus australis* and *Schoinobates volans* in the Yellingbo area, C. Victoria, in 1965 and 1966, I came to the conclusion that it was only the *Petaurus* that uttered the calls described and that the *Schoinobates* was, in fact, quite dumb. A similar conclusion was reached about the same time by others who were studying *Schoinobates,* and C.

Photo: J. Walker.

Figure 1. *Petaurus australis* in flight.

The specimen was caught near Buchan, then released in daylight and photographed.

H. Tindale-Biscoe* stated (letter, 5/10/1966) that neither Roger Smith* nor he had ever heard *Schoinobates* make any sound at all.

There are a number of factors which may account for the original misunderstanding. The two species are often sympatric. The *Petaurus* is vocal but tends to escape notice because of its often timid habits, rapid cross-country movement, and the fact that its eyes are not very reflective in a beam of light. *Schoinobates* is the more abundant, is slow-moving, is not timid, and its eyes are very reflective.

Fleay began by attributing all the calls of *Petaurus australis* to *Schoinobates*, but, over the years, was able to associate certain calls (those of captive animals and of animals observed feeding in the bush) with their true author. The remaining call, the "sustained gurgling cry" which "diminishes in volume", appeared to remain with *Schoinobates;* but it is, in fact, the typical gliding call of *Petaurus australis,* as it is heard when the direction of the glide is away from the listener.

The work at Yellingbo involved watching individual animals for long periods, using binoculars on moonlight nights and avoiding the use of spotlights, so that undisturbed feeding, climbing and gliding activi-

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ties could be observed. This experience, together with more general observations, leaves no doubt that *Schoinobates* is indeed mute and that all the loud shrieks and gurgling calls under consideration are uttered by *Petaurus australis*. When one or other of the calls is heard it can be accepted that the *Petaurus* is present even though the animal itself may not be sighted.

In documenting a survey of mammals in the Richmond and Clarence Rivers area of N.E. New South Wales, Calaby (1966) made comments relevant to the matters under consideration:

> "*Petaurus australis* . . . is undoubtedly the rarest of the gliding possums in the survey area . . . Evidence of its presence was obtained in only two localities . . . This species is apparently not known to most locals or is not distinguished by them from subadult examples of . . . *Schoinobates volans*.
>
> *Schoinobates volans* . . . is the most abundant phalangerid in the survey area . . . It is very conspicuous at night as it is usually high in trees and remains immobile when caught in the spotlight, and it has a very bright eye-shine. It is also rather vocal at night.

The last sentence is evidently a further instance of attributing the voice of *Petaurus australis* to *Schoinobates*, and it indicates that the former was, in fact, less rare in the study area than was supposed.

Feeding Habits

According to their foods, species of Australian possums fall into two categories. The smaller kinds are essentially eaters of insects and nectar, and the larger kinds are foliage eaters. Together with several other genera, *Petaurus* belongs in the former category, and of the species in this category, *P. australis* is the largest in size.

Over a period of ten years, evidence has been gathered relating to the feeding habits of this glider, and the observations concerned are set out in this section under subheadings according to the species of eucalypts with which the activities have been associated.

The observations do not include any instances of the gliders catching or eating adult insects, but it is assumed that they forage for them about the limbs and foliage of trees. In fact, the absence of evidence of other sources of food in many areas where the gliders have been observed, suggests that arboreal arthropods comprise most of their food.

Most of the data about feeding habits concern the removal of areas of bark from the trunks of various eucalypt trees, to obtain the sugary sap. In this respect, *Petaurus australis* is evidently unique amongst the phalangerids.*

This activity was commented upon by Fleay (1947), who described "scarred and pitted trunks" of Manna Gum trees in the vicinity of Badger Creek, Healesville, E.C. Victoria, and by Brazenor (1950), who referred to "heart-shaped lesions in eucalypt bark".

The significance of shape in this bark-removing process became apparent on close examination of freshly worked trunks of Mountain Gum trees in the upper Buchan River area, E. Victoria, in November, 1968. Actually, the bark is usually removed in such a way that the lower edges of the bared sapwood form a neat V-shape. The innermost bark layers, at the edge of the V, are trimmed as neatly and as straight

*Ride (1960) says that **P. norfolcensis** and **P. breviceps** "feed on the sap of branches which they strip and pierce with their powerful incisors", but does not credit **P. australis** with the activity. Observation in Victoria indicates that, though the smaller species may lick exuding gum, their bark-tearing is restricted to dry outer layers from which they obtain insect larvae.

Figure 2. Trees scarred by sap-tapping operations of *Petaurus australis*.

A. Mountain Grey Gum near Buchan. (Note V-shaped scar near top.)

B. Fishbone pattern on trunk of Apple Box near Wingan River.

C. Trunk of Apple Box at Gipsy Point, showing comparatively crude sap-tapping operation.

as if a sharp knife were used. The sap flow is thus channelled to the point of the V, where it can be licked up during periodic visits by the glider. This is precisely the method used to tap the sap (latex) of rubber trees. Figure 4D illustrates the edge of one of the V-shaped incisions on a Manna Gum trunk near Noojee, E.C. Victoria. In this case the sloping channel has been gouged quite deeply.

The implement used, both for the removal of large pieces of bark and for the final trimming, is the pair of procumbent lower incisor teeth. These protrude approximately half an inch (13 mm.) beyond the apex of the jaw, their combined width at the base is approximately 5 mm., and they taper to a fairly sharp point. Claw marks associated with work on the Mountain Gums near the Buchan River indicate that, when gouging with the chisel-like incisors, the glider clings tightly with the widely spread fore-limbs, while the hind-limbs are used as props without their claws being fastened into the bark.

Although sap-tapping is given prominence in this article, it evidently constitutes the least important of the gliders' food-getting operations. I have observed four pairs of *Petaurus australis* feeding on nectar and only one pair actually feeding on sap.

Apple Box, *E. bridgesiana*

On about 1/1/1960, two trees were examined near Wingan River, E. Victoria, each with large scars where bark had been removed. Near one of these trees, Messrs. D. and J. Hodson, who drew my attention to them, had observed a specimen, identifiable from their description as *Petaurus australis,* curled up asleep on the ground. It awoke, climbed a nearby tree and entered a hollow.

The second tree, which stood about a mile away, is illustrated in Figure 2B. The scars make a definite fish-bone pattern on the trunk. It was visited again on 12/9/1961 but showed no sign of any further working. However, that night another tree was located about 100 yards away, where two gliders were busy licking sap from incisions in the trunk some 25 feet from the ground. Occasionally one or other of them uttered a loud call. The lower animal was photographed (Figure 3), and it was so intent on its feeding that it did not stop, even to look down, when some sticks were thrown near it. These were probably the animals responsible for operations on the other tree nearby, for the pattern in each case was almost the same. None of the other Apple Box trees in the vicinity had been worked.

On 17/11/1965, two further trees were examined in the Wingan River area, about two miles from those found by the Hodsons. They stood about half a mile apart, on the property of B. H. Buckland, and in each case none of the other Apple Box trees nearby had been tapped for sap. One had a trunk approximately 30 feet high, patterned with numerous V-shaped healed scars (Figure 4C) as well as areas of bark removed quite recently, and Buckland reported having heard and seen the animals working at it some weeks before. The second tree was very large, with a 50-foot barrel covered with comparatively small scars of various ages. It is the tree on the extreme right in Figure 5. The two photographs were taken on 27/12/1965, and the area was revisited on 1/11/1966 and 17/1/1968, but on none of the four occasions were any gliders heard or seen in the area.

Figure 2C is a specimen of Apple Box at Gipsy Point, 5 miles east of Genoa, E. Victoria. A second tree nearby bore similar scars but none of the many others did. An evening's observation revealed no sign of the gliders, though four had been seen there on the night of 11/11/1962 by R. E. Taylor, Fisheries and Wildlife Inspector of Mallacoota.

A tree similarly scarred to that shown in Figure 2C was observed a number of times in 1965 and 1966 at Canni Creek, 7 miles S.S.W. of Buchan, E. Victoria, but dates were not recorded. It was not worked during the period of the observations. The Gipsy Point and Canni Creek operations appear to be of somewhat cruder workmanship than those observed in the Wingan River area, and each evidently represents only a single sap-tapping episode.

"Witchety Grub" Extraction

Another Apple Box tree on the Buckland property at Wingan River (that in the foreground in Figure 5) had a large area of bark removed, evidently in search of the large concertina-shaped "witchety grub" type of boring larvae of certain large moths or longicorn beetles. The horizontal tunnels that these larvae had made were bared, in some cases almost round the tree.

A similar set of excavations had been observed on 9/1/1961, on an

Figure 3. *Petaurus australis* feeding on sap from trunk of Apple Box near Wingan River.

Apple Box tree at the head of Mississippi Creek, 5 miles east of Bruthen, E. Victoria. No glider was seen in the vicinity but the typical shriek was heard at night in the forest nearby.

On 27/9/1968, an Apple Box tree, debarked in the same way, was found by the Jacobs River, in far-southern New South Wales, about a mile from its confluence with the Snowy River. On the night of 19/11/1968, during some hours of spotlight observing along the two rivers, no sign was seen of *P. australis* and its call was not heard.

On 19/5/1969, several Apple Box trees which had bark ripped off by animals seeking larvae were found close together in a small flat by the Suggan Buggan River, E. Victoria. One sizable tree had died as a result of the ring-barking.

An example of this operation is illustrated in Figure 4A, with the bared horizontal tunnels clearly visible. The photograph was taken near the Pyramids by the Murrindal River, 4 miles N.N.E. of Buchan, on 21/11/1969. The debarked section was only 1½ to 3 feet above ground level.

A further example was seen at the Reed Bed, 4 miles west of Cann River, E. Victoria, on 6/12/1969.

These larva-seeking operations are believed to be the work of *Petaurus australis,* but this has not been confirmed by observing animals at work. Black Cockatoos extract large boring larvae from tree-trunks, but they dig deep into the wood, to precisely where the larva is, evidently being able to locate its position by their keen hearing. Fleay (1947) found that in captivity *P. australis* did not display any fondness for the "concertina larvae of longicorn beetles".

Manna Gum, *E. viminalis*

During a 2-year period, from September, 1965 onward, a series of night observations were made along Woori Yallock Creek and its tributaries in the vicinity of Yellingbo, C. Victoria. There are corridors of mixed Swamp Gum (*E. ovata*) and Manna Gum forest along the streams.

A pair of *Petaurus australis* used the area from time to time, taking up residence for periods varying from several days to a few weeks, and at other times they could not be found or heard in the general area. For example, they were present when the locality was visited on 17, 18, 19, 20, 23 and 24 January, 1967, but were not there when visits were made on 25 and 26 January, 11 and 25 February, and 4 March. On 18 and 19 March, they had returned and were feeding on nectar of Manna Gums which had recently come into flower.

Amongst the many Manna Gum trees in the Yellingbo area, there were three, separated from each other by intervals of over a mile, which bore numerous scars due to operations of the gliders. However, the animals did not work on these trees during the two years of observation, though they did attack one other tree during the time, to about

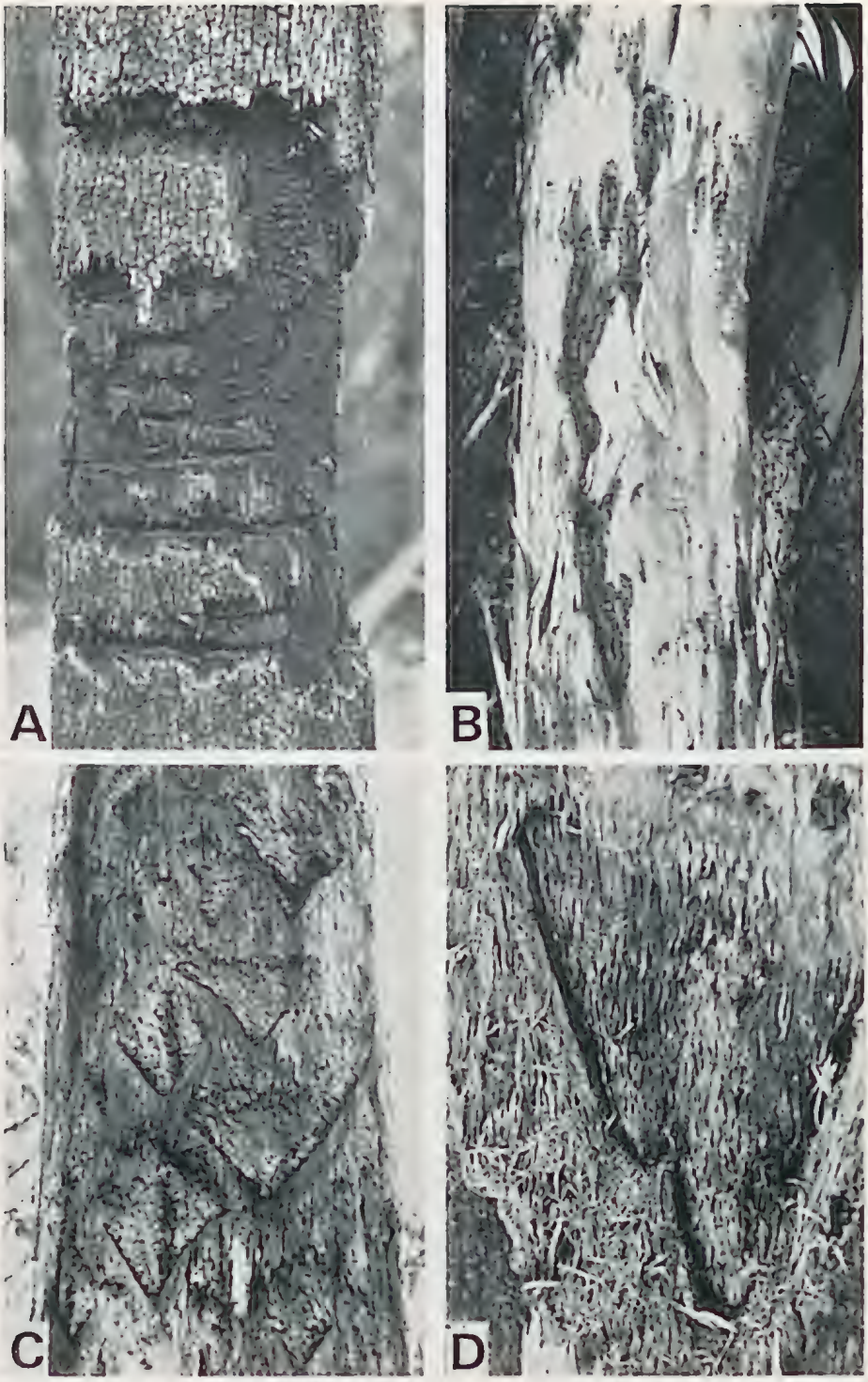
Figure 4. Examples of work of *Petaurus australis.*

A. Trunk of Apple Box (diam. 15 inches), near Murrindal River, with bark removed in quest of "witchety grubs." (Note horizontal tunnels.)

B. Healed scars after a single sap-tapping operation on Manna Gum (diam. 2 feet) near Wingan River.

C. Healed V-shaped scars on trunk of Apple Box (diam. 2 feet) near Wingan River.

D. Neatly trimmed and deeply gouged edge of V-shaped cut in bark of Manna Gum near Noojee. (One-third natural size.)


A
B
C
D

the extent which is illustrated in Figure 4B.

Figure 4B illustrates a set of healed scars on a Manna Gum on the Buckland property at Wingan River. This was observed first on 17/11/1965 and was photographed on 27/12/1965. Evidently the scars represent a single operation performed in spring that year, and there has been no subsequent work on that tree.

On the night of 13/11/1965, W. King observed two of the gliders feeding on the trunk of a large Manna Gum approximately 2 miles north of Noojee. The animals were not in the area when he and I visited it some months later. On 18/10/1969 it was found that the trunk had been worked considerably within the past several days. The photograph comprising Figure 4D was taken on that occasion. The tree bears evidence of a history of sap-tapping extending over many years. Also on 18/10/1969, a tall slender much-worked Manna Gum was noted approximately 6 miles west of Noojee.

Blue Gum, *E. bicostata*

A massive Blue Gum, with numerous scars due to sap-tapping, was found on the western side of Mount Drummer, E. Victoria, on 15/11/1962. On 31/10/1966 it was noted that there had been some recent working at the same tree. Of the many Blue Gums in the area, only the one was found to be scarred by the gliders.

G. G. George had reported (letter, 3/4/1962) seeing *Petaurus australis* amongst that area of Blue Gums in January, 1961. On the night of 28/12/1965, I observed two specimens in Blue Gums approximately 6 miles N.N.W. of Buchan.

Shining Gum, *E. nitens*

On 27/2/1966, in the forest of Shining Gums, a few miles west of Cumberland Junction, E.C. Victoria, a single huge tree was found with innumerable scars of various ages on the trunk. Several visits were made to the spot between September 10 and October 1 that year, and *Petaurus australis* was present on each occasion. Some additional tapping had been done shortly before September 10. There was no evidence of the animals in the area on the occasions of two visits during 1967, but on 26/12/1969 it was noted that some small patches of bark had been removed recently.

The removal of small areas of bark, from various eucalypt species, both from previously worked trees and from trees not otherwise worked, has been observed in a number of places, and it is presumed that the gliders had been testing the qualities of the sap.

W. King (pers. comm., 30/5/1970) reported that on 9-10/12/1967 he observed *P. australis* in Shining Gum at 3,400 feet elevation in the upper Thompson River area, and that on 24/1/1970 he heard it in trees of the same species at 2,600 feet elevation near Starling Gap. These localities are respectively 13 miles N.E. and 14 miles W.N.W. of Noojee, E.C. Victoria.

Mountain Gum, *E. dalrympleana*

About a mile east of Native Dog Flat, upper Buchan River, E. Victoria, there are several specimens of Mountain Gum with trunks extensively scarred by *Petaurus australis*. They were observed on 20/11/1968 and again on 28/1/1969, and some tapping had been done between these dates.

Fleay (1933a) and Brazenor (1934) identified the trees in which

Figure 5. Feeding area of *Petaurus australis* in Apple Box forest near Wingan River.

The tree in foreground has been de-barked in quest of "witchety grubs," and that on extreme right bears numerous scars from sap-tapping operations.

they saw *Petaurus australis* near Mount Wills as "Manna Gum (*E. viminalis*)", but these would have been *E. dalrympleana* at that elevation. (The two species were not generally recognized as distinct at that time.) Fleay noted that one of the gliders "appeared to eat the finer tips of some tender suckers growing out from the main trunk of a eucalypt". If this was in fact a feeding activity, it is safe to assume that insect food of some kind was taken, not the leaves themselves. Otherwise he noted that the glider fed on exuded gum for three-quarters of an hour and then on nectar from the blossoms for several hours. Brazenor (1934) stated that the blossoms themselves were consumed, but Fleay's interpretation would have been the correct one.

On 23/4/1966 I observed *Petaurus australis* in Mountain Gums at approximately 4,000 feet, two miles east of Mount Nugong, E. Victoria. The gums were flowering in that area but no actual feeding observation was made.

Mountain Grey Gum, *E. cypellocarpa*

Though this is a widespread and abundant component of E. Victorian forests, only one has been observed with evidence of gliders' sap-tapping. It is approximately 6 miles south-east of Buchan, and was first observed on 9/4/1966. When photographed on 31/10/1966 (Figure 2A) some recent working was evident.

Bloodwood, *E. gummifera*

The Bloodwood occurs in Victoria only in the extreme east, near Mallacoota, and is there quite abundant. Its forests are evidently inhabited by the gliders but very little observation has been carried out there.

Trees scarred by sap-tapping were noted on 26/3/1966 in one place, and a more extensive search (10-11/4/1966) revealed that worked trees were scattered, fairly plentifully, through the Bloodwood forests. On the latter occasion, gliders were observed feeding on nectar from the abundant Bloodwood blossoms, two pairs of animals in one place and one pair in another spot about three miles distant.

Messmate, *E. obliqua*

On 16/10/1966, a Messmate tree, from which gliders had removed areas of bark, right to the sapwood, was discovered 2 miles south of Emerald, C. Victoria. Gliders were heard in the area that night but none was seen at the tree. A second Messmate specimen, similarly operated upon, was noted on 17/3/1967, 3 miles north-east of Monbulk, in the same district. On 26/12/1969, a grove of Messmates was examined in the latter locality and two were found with both new and old sap-tapping scars, while several other trees showed evidence of minor, possibly exploratory, attention. It is remarkable that the small animals are able to tear through the layers of tough stringy bark, 2 to 3 inches thick, that encase the trunks of those Messmates.

Red Ironbark, *E. sideroxylon*

Buckland (1960), writing of gliders at Mallacoota, which he thought at the time to be the Greater Glider (*Schoinobates*), noted that "when the eucalypts, especially Red Ironbark are in flower, the very distinctive calls of these animals can be heard throughout the night". The reference to calls, and an accompanying comment about the extent of the gliding membrane on each leg, leaves no doubt that these notes apply to *Petaurus australis*.

Distribution

Petaurus australis belongs to temperate eastern Australia, ranging from the Bundaberg area of S.E. Queensland, through eastern New South Wales and eastern and southern Victoria, to the forests north-west of Portland. Skeletal remains from an aboriginal shelter near Donovans Landing (*leg.* A. C. Beaglehole, 9/10/1963) indicate that the species ranged into the extreme south-east of South Australia within the past few hundred years, and it may still occur there.

In Victoria it inhabits a wide range of forest types, from about sea level to approximately 4,000 feet elevation. In central Victoria its preference is for the stands of tall straight Manna Gum trees along foothill streams and Shining Gum at higher elevations. In the lowlands of Eastern Victoria it favours Apple Box trees of dry sclerophyll forest formations, in the more eastern highlands the wet sclerophyll forests of Mountain Gum are preferred, and in the associated foothills the glider frequents Blue Gum forests.

The lower parts of the valleys of the Jacobs and Suggan Buggan Rivers, as well as the environs of the Snowy River, into which the other two flow, are parts of a comparatively dry area receiving only about 20 inches rainfall per annum. The general forest is open woodland of White Box (*Eucalyptus albens*) and cypress-pine (*Callitris*). However, along the banks of the rivers there are Manna Gums and Apple Box trees which evidently provide narrow corridors of suitable habitat for *Petaurus australis*. This riparian growth would be classed as dry sclerophyll forest. E. Watkinson reported (pers. comm., 19/11/1968) that in the vicinity of his home by the Suggan Buggan River, the species may be heard for several nights in succession and then not at all for many months.

At the beginning of his account of the Mount Wills observations, Fleay (1933a) mentions an elevation of 4,800 feet, and "searching the woolly-butt* and Manna Gum forest". With these comments as basis, Troughton (1941) located the observations at "about 5,000 feet in the Woollybutt Gum belt". But Fleay was not specific regarding the disposition of the two tree species in the area or the actual elevation at which the gliders were observed. Usually, the upper limit of the "woolly-butts" is at about 5,000 feet, and the upper limit of the Mountain Gum is several hundred feet lower.

The species referred to by Fleay as woolly-butt* is, in fact, Alpine Ash (*Eucalyptus delegatensis*). During the past ten years I have examined a number of areas of Alpine Ash but to date have not recorded *Petaurus australis* in stands of that species. However, W. King's observations at upper Thompson River included the sighting of the species in Alpine Ash trees where these were associated with Shining Gum. It is probable that the true association, both in this locality and at Mount Wills, was with the gum species rather than the Alpine Ash.

Petaurus australis evidently does not favour the wettest Victorian forests—those comprising pure stands of White Mountain Ash (*Eucalyptus regnans*). Despite extensive observations, I have never seen or heard the species in these forests, and as

*Fleay identified this eucalypt as **E. longifolia,** which is the name of the true Woolly-butt Gum, a native of New South Wales but not Victoria. Brazenor (1934) identified the Mount Wills "wooly-butts" as **E. sieberiana,** which is a synonym of **E. sieberi,** the Silvertop, a tree of lower elevations which is erroneously referred to as woolly-butt in some districts.

far as is known there is no record of such association.

Le Souef and Burrell (1926) assessed the habitat of *P. australis* as "open timbered country", and commented that they had "noted it in eastern Victoria, where the Yellow Box and Red Gum were predominant". This would indicate that the species inhabits the woodlands of the Gippsland Plains, where Red Gums (*E. camaldulensis* and *E. tereticornis*) are the dominant trees. During the present study, no evidence to support this has come to light, and it is more likely that the species was noted in forest formations lateral to the Red Gum woodlands.

Gliding and other Behaviour

Petaurus australis moves with speed and agility, especially amongst the high branches of trees. It will scamper along a slender branch, for instance, and, without a pause, leap across several feet of clear space to land amongst the twigs of a nearby tree.

When frightened, it may seek a concealed position and remain motionless there for a lengthy period. One individual, when illuminated by spotlight, moved down into the fork of a tree trunk and remained there for some time with only its tail visible. Another, when a Powerful Owl was hunting in the vicinity, was observed to hide on the underside of a large horizontal limb, and it was still in precisely the same position when observations were made again at the spot over an hour later.

During 1965 and 1966, in the Yellingbo area, a number of glides of *Petaurus australis* were accurately measured (using Abney level, plumb-bob and steel tape), and it was found that, almost invariably, the line of flight was very close to 30° to the horizontal. By contrast, *Schoinobates* usually glided at approximately 40° to the horizontal. This is an expression of the different gliding abilities of the two species, and it is probably because the gliding membrane of *Schoinobates* extends only to about the elbow of the fore-limb.

Petaurus, moreover, often makes several glides in quick succession, thus covering several hundred yards in a few minutes, whereas *Schoinobates* is typically slow in its movements and apparently does not range far from its home tree. This is evidently because the one is a nomad, ranging widely according to availability of nectar, insects and sap, while the other is a sedentary foliage-eater.

Some long glides, attributed in the literature to the *Schoinobates*, belong, in fact, to *Petaurus australis*. Buckland's notes (*loc. cit.*) provide an example, but the length given for a glide, 130 yards, would be an over-estimation, as the trees in the locality are not high enough for such a performance.

Troughton (1941), in discussing *Schoinobates volans*, states that it is "naturally the record glider of the possum world", and in support of this he cites a report of an animal which was observed by a resident of Milton, New South Wales, to cover a distance of 590 yards in six successive glides, two of which measured 120 yards each (from tree to tree) and another of which was from a tree 100 feet high to the base of a second tree 70 yards away.

The 70-yard glide from a 100-foot tree indicates an angle of descent of 26° to the horizontal, and, even allowing for sloping ground and a margin of error in the measurements, this performance, though well within the capabilities of *Petaurus*, is quite outside that of *Schoinobates*. Also, for the 120-yard glides,

Schoinobates would require, for its 40° descent, a take-off point approximately 300 feet high, while *Petaurus* would need a 200-feet tree. Other features of the Milton resident's report — that during the performance the animal "lost no time in ascending three more trees" and that "it uttered its peculiar squealing call" — leave no doubt that the "record glider" was, in fact, *Petaurus australis* and not *Schoinobates volans.*

Figure 6. *Petaurus australis* in Shining Gum sapling near Cumberland Junction.

This animal had landed here after gliding round in a half-circle.

The aerobatic ability of the *Petaurus* was demonstrated in the Shining Gum forest near Cumberland Junction on the night of 10/9/1966, when a spotlight beam was directed at a glider which was approaching through the air. Its response was to bank steeply, execute a tight half-circle, and then land in a tree back in the direction from which it had come. (See Figure 6.)

What may be claimed as the record glide was observed in the same locality on the night of 24/9/1966, and subsequent measurement and calculation showed that the take-off point was 215 feet high, the horizontal distance covered was 376 feet, and the actual air distance was 430 feet.

Summary

Petaurus australis, in the one population, may vary from brownish above and yellowish beneath to silver-grey and black above and creamy-white beneath. *P. australis reginae,* based on a pale specimen, is evidently not a valid subspecies.

The vernacular, Yellow-bellied Glider, is unsatisfactory and could well be replaced by Dusky Glider.

The species is essentially an insect-eater and nectar-eater, and it occasionally removes bark from trunks of eucalypts to obtain sap. Usually the bark is removed in a V-shape, with the lower edges

trimmed so that sap drains to the point, just as latex is tapped from rubber trees. In Victoria, sap-tapping is carried out mainly on *Eucalyptus viminalis* and *E. bridgesiana* and to a lesser extent on *E. bicostata, E. dalrympleana, E. gummifera, E. cypellocarpa* and *E. obliqua.* Very few trees are selected for this purpose, but those chosen are usually tapped at intervals over periods of many years. It is believed that the glider also removes bark from *E. bridgesiana* in quest of large boring insect larvae.

P. australis ranges from S.E. Queensland to about the Victoria-South Australia border. In Victoria it inhabits both wet and dry sclerophyll forests, from sea-level to about 4,000 feet elevation, but does not favour the very wet forests of *Eucalyptus regnans.* Its habitat includes the narrow corridors of sclerophyll forest along streams in the comparatively dry areas of open woodland in the Snowy River valley.

It is quick in its movements, is capable of gliding at least 125 yards (horizontal distance) at a time, and habitually travels rapidly across country by means of a series of glides. It is nomadic, according to availability of its various foods. Individuals often call loudly while feeding, climbing about or gliding, thus enabling pairs to keep in contact while foraging and during cross-country movement. The voice and gliding accomplishments of *Petaurus australis* have been credited erroneously to *Schoinobates,* which is, in fact, a sedentary, slow-moving, silent animal of minor gliding ability.

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Appendix

Following are latitude (south) and longitude (east) of the principal localities mentioned in the article:

Beaconsfield Upper	38°00′,	145°25′
Bruthen	37°43′,	147°48′
Buchan	37°30′,	148°10′
Buchan River, Upper	36°53′,	148°05′
Cann River	37°34′,	149°09′
Cumberland Junction	37°34′,	145°56′
Donovans Landing	38°02′,	140°57′
Emerald	37°56′,	145°26′
Healesville	37°40′,	145°31′
Jacobs River	36°45′,	148°27′
Kinglake	37°32′,	145°21′
Mallacoota	37°33′,	149°45′
Monbulk	37°52′,	145°24′
Mount Drummer	37°34′,	149°21′
Mount Nugong	37°13′,	147°55′
Mount Wills	36°49′,	147°28′
Noojee	37°55′,	146°00′
Portland	38°21′,	141°36′
Suggan Buggan River	36°57′,	148°25′
Wingan River	37°33′,	149°27′
Yellingbo	37°49′,	145°31′

Wallabies We Knew

by

JEANETTE KING

(Illustrations by Author)

We lived on an island in Tasmanian waters for about ten months, and except for one other family, were fifty miles from people, telephones and shops. The sea was an efficient moat, and preserved our isolation. The *Victorian Naturalist* of 1891 describes the island as being "about four miles by two and very hilly. The valleys are mostly covered with thick tussocky grass, knee deep, and the hills with short dense scrub, consisting principally of Sheoke, Melaleuca, a small variety of eucalyptus, Pine (*Callitris* sp.), Banksia, Acacias and Teatree. All around the island except in the coves are bold granite cliffs, and limestone is plentiful near the surface. There are several hills between 500 and 700 feet high."

The house we lived in was enclosed in a valley formed by the hills on three sides, and was sheltered from all but the north-west winds. The first wallaby we met was Nelson, a female about a year old; one of her eyes, although present, was permanently half-closed, presumably the result of a fight, or damage done while moving through the scrub in a hurry. Her mother, Gertie, had been allowed the run of the place when the people previous to us had lived there, and they had seen Nelson brought out of the pouch and watched her grow up.

When we arrived, the lawn was in an unpleasant state for barefooted walking, so we declared the lawns of front and back yards out of bounds to the wallabies. The possums there were tame, but when you are entirely dependent on the water from the roof for drinking, they are not welcome visitors.

After months of observing the wallabies closely, and coming to know them individually by sight, we believe they are of two separate types; although very similar, there are slight differences. One group was of a more uniform grey, not as thickly furred, and rat-like in appearance. The other type was prettier, of heavier build, with thicker fur more reddish on the neck, and had facial features similar to deer. The population of wallabies on the island was large, and seemed to be broken up into groups which moved about together. The two types were to be found among any group. Each group had its own territory, but transference from one to another would appear to be not unusual, and often a wallaby was seen quite a distance from its home.

It took some time to become accustomed to being able to glance out of the windows and see wallabies grazing unconcernedly only a few feet away, and the St. Fran-

ciscan procession following my bearded long-haired husband as he held pellet-tin on high; with dog, child, hens and rooster, and seven greedy wallabies clutching at his trousers as he walked. A sound which became familiar was the "bong, bong, bong" of speeding wallabies' feet on the ground. In a short time, encouraged by the presence of the already tame ones, as many as seven would come when we called. On hearing a yell of "come on, come on," they would converge on us from hiding places in the scrub, the tamer ones coming close, the shyer ones remaining at a strategic distance. Occasionally a strange one on his way past would step out of the bushes to investigate, and sometimes these could be persuaded to become part of the group of regular visitors, but the attraction was more likely to have been the females rather than our proffered tidbits and company.

All of them loathed being touched either by human or their own kind, and even after some months of acquaintance they would, unless urgently occupied in eating, hop off or turn and warn the offender with a huff, at the same time shaking their ears in a manner meant to threaten. The huffing noise, more of an exhalation than a growl, was the only vocal sound they ever made, even when in pain or badly frightened. When one did manage to stroke them (and this was only possible while the wallaby was eating) the ribs of even the fattest felt like the rungs of a corrugated water-tank.

On one occasion, as we returned from a climb through the scrub nearest the house, we came upon the dog sitting guiltily beside an immobile wallaby. After watching its completely silent, frantic and useless efforts to right itself without the use of one apparently damaged leg, the only thing to do seemed to be destroy it. With difficulty it was held, the leg manipulated in circles and the animal set back on the ground; it bounded off in a normal manner. Throughout its certainly painful and distressing experience, it had made not a sound of protest or fright.

The ears swivel in a full circle, and usually each is in a different direction from the other, and constantly alert. A proferred morsel will be investigated with a nose-twitch and sniffs, often from such a distance and at such a stretch that the reluctant, or lazy, wallaby would topple sideways. All their eyes are brown, round and shiny, rimmed with stiff eyelashes like those of a doll.

Their arms and shoulders were thin and narrow, much more ineffectual in appearance than those of the kangaroo, and had little strength. Their five-fingered hands were like those of a bony long-nailed old lady

wearing black wrist-length gloves.

Once, after a boat had been anchored in one of the bays, Gertie showed up with one arm dangling. Hoping it was simply out of joint, we caught her, intending to manipulate it back into place as had been done before. It appeared however to have a bullet in the shoulder, and since there was little we could do she was set free. It healed and although after a time she could move it a little, it flopped useless at her side.

The largest of the wallabies we knew were no more than a head taller than the hens, and when food was placed before them as a communal meal, the wallabies missed out on the choice items because of their docility and slowness. A pair of weak paws holding a slippery apple was never a match for a well-driven beak, and upon losing his food, the wallaby would placidly look around for something the fowls did not want.

They liked all vegetable matter, including orange and even banana peels, and although not keen on lemon peel would eat it if there was nothing else on hand. Usually only the clown known as Chook was seen to suffer for his over-eating, and would regurgitate his food in a most comical manner after a particularly big feast. The favourite food of all was the bark of a casuarina branch: they were unable to reach high enough to obtain this themselves, but when a broken branch fell to the ground every fibre of bark was stripped in a very short time. They were indiscriminate in their choice of natural food, and although we watched them closely to find if there was some variety of grass or tree they did not fancy, found there was nothing they would not sample from time to time. They were fond of the buffalo grass in the lawn, but perhaps only because it was readily available and obtainable with the least effort, involving only a rush into the yard if the gate was left open.

Each had a tussock of his own to which he returned every day, spending most of the time there, actively fossicking for food only in the morning and evening. During the dark nights they would disappear, but in bright moonlight still congregated near the house. After following the well-beaten tracks they had made through the scrub, we found an area encircled by casuarinas, of tussocks each moulded into a primitive "nest" on the side away from the wind. Presumably the wallabies spent their nights in this pleasant place.

When a gale was blowing, they would bound along with the wind behind them from the casuarinas, each to his tussock, and spend the day stretched out on the lee-side, snug in a bundle of strawy tussock-hair.

When the rain was wetting enough to bother them, they would move over to a sheltering line of eucalypts and scrub, and sit beneath these in a row, looking like a queue

of matrons waiting at a bus-stop. They sat with hands together over round bellies, in a trance until a muscle went to sleep and they would be obliged to alter position, waiting until the rain stopped before moving back to the open area.

They felt the heat badly, and by nine or so each hot day would flake out in the shade, remaining still all day. We were told they had ticks, but never found any — however, much of their time was spent in vigorous scratching and monkey-like investigations amongst the fur. The young females, particularly one we named Salome, were able to effect a cooling device by opening the pouch, and a small round patch of pink skin was exposed in the fluffy belly fur. Sitting down was an elaborate proceeding, rather reminiscent of a bride managing a turn in a dress with a long train. The wallaby would prop upright, lean to one side, sweep his tail around between his legs and sit down on the cushion thus provided. As the tail was now so close at hand, the opportunity was often seized in both paws, and an energetic scratch of the leathery working side of the tail would follow.

The group usually consisted of old Gertie, her young daughter Nelson, Chook—because of his fondness for pellets and investigation of the chook-yard, where he was able to get in via the twelve-inch square opening, but could never manage to return through it — and Ron, a large female, the most beautiful of all, named by our son. (We were peering through the window at her before we knew them all, and when I asked if it was Chook and was told "wrong gender," our son took it that she had been christened "Ron Genda," and "Ron" thereafter she remained.) We could not work out with any certainty the relationships between them all, but it seemed that Gertie was the matriach, that Nelson was her daughter we knew, Chook, a male, was the same age as Nelson and must have migrated from another group, and middle-aged Ron, Salome visited only occasionally, and Josie, Gertie's second joey was not long out of the pouch and preferred to remain just hidden in the scrub. Often the group would include large males who did not stay long enough to be named, and although the young females would surely be the more interesting, they courted old Gertie, and Ron.

After a time, Ron had become noticably portly, and on closer inspection we concluded she had a joey of approximately three to four inches in length in her pouch. Gertie's two offspring had arrived before we did, and we hoped that we would be able to see one brought out of the pouch. At times Ron would sit back on her haunches, rummage through her pocket, and investigate the contents. As the weight grew increasingly burdensome, and we could see vigorous internal jumpings, she found difficulty in bending over to eat, and her appetite was insatiable. She was always first to arrive at mealtimes, and became desperately greedy in her attempts to obtain the lion's share of food.

The two matrons had dreadful fights, standing erect, using feeble swipes of the hands to find the other's eyes, and long-nailed feet to rake the other's belly. This was distressing to watch, especially when a pouch was filled with an active, growing bulge. Some damage must have been done in this way, as a few days after one bout Ron re-appeared with an empty pouch and a most miserable attitude.

Mating must have taken place at night, since it never did during the day. When Chook or one of the strange males felt amorous he would languidly approach Ron or Gert from the rear, and clutch at her back while she was bending over to eat — invariably she would simply hop one or two paces ahead without even appearing to notice him, and continue eating until he caught up again and made another perfunctory grab. Not once would she turn to look at the pursuer or show interest in anything other than the grass she cropped all the while. So the pair would proceed around the house for hours, and whether he ever caught up when she led off into the bush we do not know. The strange visitors grew very possessive, and would swipe and huff at anyone approaching his mate. Even a joey returning to the pouch for a drink would be bowled over, eventually learning to keep out of the reach of the new object of his mother's attention.

As a farewell gift when we left the island, we extracted from the garden two dozen cabbages nursed along unsuccessfully for nine months, piled these up in front of them all, and drove off down the rutty road as they huffed and fought each other for them.

The value of this co-habitation is enhanced by the knowledge that not only may it be unique (or is growing increasingly more likely to become so) but also by the fact that the wallabies were free to come and go as they pleased, and it flattered us that they chose to seek our company. I know of relatively few places on the mainland where this could happen today, and even the glimpse of a startled wallaby disappearing into the bush is rare, outside zoo or sanctuary.

The next occupants of that house allowed their large dog to do as he pleased, and our wallabies were found dead on the back lawn.

. . . . . .

The islands of Bass Strait are considered by the fishermen as convenient and never-abating sources of readily obtained items for use as bait on sharklines or in craypots. No other portion of wallaby is found to have anything worthwhile on it, so they are killed just for the legs. When next you enjoy a crayfish, spare a thought for the wallaby who donated the bait in the craypot!

Field Naturalists Club of Victoria

General Meeting

13 July, 1970

Mr. T. Sault, the President, opened the meeting and extended a welcome to the 80 members and guests present.

Mr. D. Lee, the Secretary, called on members who had tabled exhibits to come forward and speak briefly on their displays.

Exhibits:

Mr. D. McInnes—Fossil coral specimens collected on the Geology excursion

to Lilydale Quarry and under the stereo microscope, a mat plant (Corsicala); a moss common on garden paths and pond life (Daphnia).

Mrs. E. Bennett—An uncommon Gall on a Peppermint Gum from the South Gippsland area.

Mr. R. Condron—Wood White Butterfly and Pupa Case (*Delias aganippe*). The pupa was originally collected by Mr. T. Sault and shown at the April meeting. The butterfly emerged on 19th June.

Mrs. G. Taylor—5 Jewel Shield Bugs from East Alligator River, Northern Territory and a giant bean pod (Cassia spp.) from Darwin.

Mr. J. Myers—A Brachiopod of the Triassic period (*Clavigera bisulcata* Hector) from the Melton District, South Island, N.Z.

Mr. Ken Strong—Washed river sand under the stereo microscope displaying colors by light passing through polaroid and sellotape.

Mr. T. Sault—Several specimens of land mollusca, to be forwarded to Dr. Brian Smith for his survey.

Mr. A. Swaby—a number of species of native flora. Notably the Hairpin Banksia (*Banksia spinulosa* previously *B. collina*) and the Australian Bluebell (*Sollya fusiformis* previously *S. heterophylla*).

The poster to advertise the Nature Show, drawn by Miss M. Lester was also tabled.

Mr. J. Myers, F.N.C.V. delegate to the Lerderderg Forest Park Committee of Management, reported on the work of the Committee for the past half year and gave details of improvements already undertaken and proposed future developments to cope with the expected increase of visitors to the area. This report will be published in full in the Victorian Naturalist at a later date.

The Secretary announced that Mrs. Daisy Wood had resigned from the You Yangs Forest Park Committee and a new delegate was required. Mrs. Poole had been nominated and this was to be referred to Council.

A letter was received from Mr. Lionel Kell Elmore of Hamilton requesting support for the declaration of Mt. Napier as a National Park. Mt. Napier, an extinct volcano with parasitic cones and several lava flows would be an ideal area for preservation as a geological monument.

The President announced the impending retirement of the Secretary, Mr. D. Lee, in December and called for nominations for his replacement.

Mr. D. McInnes would be retiring from the Nature Show Committee after the coming show and a new Director was needed. The Club's patron, Sir Rohan Delacombe, advised that he would be unable to attend this year's show because of a prior engagement.

Mr. J. Myers would be attending the University of New England Spring School at Warrumbungle, N.S.W. in September and had 3 vacancies available. Those interested to contact Mr. Myers.

Mr. R. T. M. Pescott, retiring Director of the National Herbarium and the Royal Botanic Gardens was guest speaker for the evening, his subject being "A Biological Survey of Victoria". His address will be published in the Victorian Naturalist in the near future. The presentation of an inscribed spade and silver tray was made by Mr. J. Ros Garnet to Mr. Pescott on behalf of the F.N.C.V. members. Mr. Garnet gave a brief outline of Mr. Pescott's career, mentioning that he was a founding member of the National Parks Association and was a valued member of the F.N.C.V., having given much help over his many years of association with the Club.

Continued from p. 214.

At the August general meeting of the F.N.C.V., rosters for helpers at the Show will be distributed. All available help from both long-standing and new members is required, particularly during the daytime.

Sunday, 12 September—from 9 a.m. onwards—will be the day to set up the Show. This is an excellent way for new members to get to know their fellow "Field Nats." Also available at the meeting will be window cards, car stickers, and, for distribution to schools, small posters and bundles of pamphlets. Your committee is relying on your help in supplying every school in the metropolitan area with the latter.

Please make this Show known as widely as possible.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10 August—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Nature Notes and Exhibits.
3. Subject for evening — "The Continental Drift": Dr. R. T. Forbes.
4. New Members. 5. General Business. 6. Correspondence.

Monday, 14 September—Mr. A. O. Lawrence, O.B.E., former Commissioner of the Forests Commission, will speak on "The Conservation Council of Victoria."

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 13 August—Botany Group. Mr. B. Fuhrer will speak on "Seaweeds of Boag's Rocks."

Friday, 14 August — Montmorency and District Junior F.N.C. meeting in Scout Hall, Petrie Park at 8 p.m.

Wednesday, 19 August—Microscopical Group meeting.

Friday, 28 August—Hawthorn Junior F.N.C. at 8 p.m. in Hawthorn Town Hall.

Wednesday, 2 September—Geology Group Meeting.

Thursday, 3 September—Mammal Survey Group meeting at 8 p.m. in the Arthur Rylah Research Centre — corner of Brown St. and Stradbroke Ave., Heidelberg.

Friday, 4 September—Preston Junior F.N.C. meeting at 8 p.m. in Rechabite Hall, 281 High Street, Preston.

Monday, 7 September—Marine Biology and Entomology Group meeting at 8 p.m. in small room next to National Museum Theatrette.

Thursday, 10 September—Botany Group meeting. Mr. L. Fell will speak on "Some Western Australian Wildflowers and Their Ecological Setting." Election of Office-bearers.

Friday, 11 September — Montmorency and District Junior F.N.C. meeting in Scout Hall, Petrie Park at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, 9 August—Botany Group excursion to Warrandyte. Details from Mr. Kleinecke, 25-2415.

Sunday, 16 August—Healesville. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.50. Bring one meal and a snack.

Saturday, 29 August to Sunday, 6 September—Wyperfeld National Park and Little Desert Camp Out. The plan is to travel to Wyperfeld on Saturday remaining there until Wednesday, then travelling to Broughtons Waterhole in the Little Desert where we will meet local Naturalists who are planning that section of the trip. Members will be responsible for their own camping gear and meals but a larger tent will be taken where meals may be eaten if necessary or members can gather if the night is cold. Food supplies can be replenished during the week. The coach fare will be $18.00 and any fares outstanding should be paid to the excursion secretary as soon as possible. Cheques should be made out to Excursion Trust. At time of writing, there are several vacancies, so those still wishing to go should contact the excursion secretary. Camping gear can be hired very cheaply if required. Coach leaves from outside Gas and Fuel Corp. building, Flinders Street, at 8 a.m. A picnic lunch should be brought. **Luggage may be left at McKenzie's depot, 53 Barkers Road, Kew, on the previous day to departure.**

Saturday and Sunday, 17-18 October—Weekend excursion to Castlemaine with the Bendigo F.N.C. Coach and Motel accommodation has been booked and the weekend should cost approximately $14.00 plus picnic meals for Saturday and Sunday.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron:

His Excellency Major-General Sir ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

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Geology: Mr. T. SAULT.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1970

Ordinary Members	$7.00
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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 September—At National Herbarium, The Domain, South Yarra; preceded by an Extra-ordinary Meeting at 7.55 p.m. to consider the admittance of Wychitella Forest Protection League as an Affiliate.

1. Minutes, Reports, Announcements.
2. Nature Notes and Exhibits.
3. Subject for evening — "The Conservation Movement in Victoria": Mr. A. O. Lawrence, former Commissioner of Forests Commission.
4. New Members.

Ordinary:
Miss M. Francis, 93 McKinnon Rd., McKinnon, 3204.
Mr C. Linnane, Flat 8, 6 Loch Street, St. Kilda, 3182. (Interest—Ornithology & Zoology.)
Mrs. J. B. Linney, Flat 18, 14 Leopold St., South Yarra, 3141. (Interest—Botany & Ornithology.
Mr. D. J. Rogers, Central Band, R.A.A.F., Laverton, 3027.

Joint:
Mr. and Mrs. R. P. Garret, 440 Belmore Rd., Box Hill North, 3129. (Interest—Botany.)

Country:
Mr. M. T. Kaveney, 54 Pine Avenue, Mullumbimby, N.S.W., 2482.
Miss F. Poole, 134 Fitzroy Street, East Geelong, 3219. (Interest—Botany.)

Junior:
Miss Myra Holmes, 5 Victoria Street, Canterbury, 3126.

5. General Business. 6. Correspondence.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated.)

Thursday, 10 September—Botany Group. Mr. L. Fell will speak on "Some W.A. Wildflowers and their Ecological Setting". An election of Office-bearers will also be held.

Friday, 11 September — Montmorency and District Junior F.N.C. meets at Scout Hall in Petrie Park at 8.00 p.m.

Wednesday, 16 September—There will be no meeting of the Microscopical Group on this night, due to the Nature Show.

Friday, 25 September—Hawthorn Junior F.N.C. meets in Hawthorn Town Hall at 8.00 p.m.

Thursday, 1 October—Mammal Survey Group meeting at 8 p.m. in the Arthur Rylah Research Centre—corner of Brown St. and Stradbroke Ave., Heidelberg.

Friday, 2 October—Preston Junior F.N.C. meets in Rechabite Hall, 281 High St., Preston, at 8 p.m.

Monday, 5 October—Marine Biology and Entomology meeting in room next to National Museum Theatrette at 8 p.m.

Wednesday, 7 October—Geology Group meeting. (See also Geology Group Excursions p. 258).

Thursday, 8 October—Botany Group. Mr. J. H. Willis will speak on "Glimpses of New Guinea Plants".

Monday, 12 October — "The Naturalists Role in a Modern World": Dr. M. Calder.

Monday, 9 November — Presentation of 1970 Natural History Medallion to Miss Jean Galbraith by Mr. R. T. M. Pescott; and an address by Miss Galbraith on "The Joy of Living".

F.N.C.V. EXCURSIONS

Sunday, 20 September—Heathcote. Leader — Mr. A. Lewis. The coach will leave Batman Ave. at 9.30 a.m. Fare $2.00. Bring two meals.

Saturday and Sunday, 17-18 October—Weekend excursion to Castlemaine with Bendigo F.N.C. D.B.B. at the motel and coach fare—$14.00. This should be paid to the Excursion Secretary by the end of September. Cheques to be made payable to Excursion Trust. Bring picnic lunch for Saturday. Two meals will be needed on Sunday.

26 December-3 January, 1971—Cann River (details next month).

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: E. King

F.N.C.V.

Vol. 87, No. 9 9 September, 1970

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The photograph shows one of the Mason Wasps **(Abispa ephippium?)**, constructing the entrance tube to one of the many cells contained in the fist-sized red clay nest. Paralysed caterpillars are placed and sealed in each cell, an egg having first been deposited by the wasp.

Photo by Graham Pizzey.

Victorian Non-Marine Molluscs – No. 1

by

BRIAN J. SMITH*

This is the first of a series of short field notes to the land and freshwater molluscs of Victoria. They are designed to give the average field naturalist some general information about the various kinds of non-marine molluscs to be found in Victoria. A single species or a small group will be described each month with notes on the general features of recognition, habitat notes and an idea of its distribution.

Genus *Victaphanta* — Large Black Snail.

Victaphanta is a genus of large, carnivorous, native snails which only occurs in the rainforests of central and south-western Victoria. It contains two closely similar species, *Victaphanta atramentaria* from the central Great Dividing Range, and *Victaphanta compacta* from the Otway area. Both these species have large black or dark brown glossy shells which are horny in texture and very fragile; adult shells are 25 to 35 mm. in diameter. They only occur in the wetter parts of the rainforest areas and are usually found buried under leaf litter or rotting logs. However, on wet, cool days they are occasionally found crawling in the open. As mentioned above they are carnivorous, catching and eating earthworms, other snails, insect larvae, etc.

The easiest way to tell the two species apart is by:

(a) distribution — they inhabit separate areas with no overlap.

Figure 1 A. dorsal view of *Victaphanta atramentaria;*
B. aperture view of *V. atramentaria;*
C. aperture view of *Victaphanta compacta.*

*Curator of Invertebrates.
National Museum of Victoria.

(b) body colour—*V. atramentaria* has a bright orange foot frill and secretes sticky orange mucus; *V. compacta* has an all black animal with no orange and secretes a colourless mucus.

(c) Shell shape—the shell of *V. compacta* is smaller and more globular than *V. atramentaria*, but you need the two for comparison to see this clearly.

Both these species have comparatively small ranges and are very susceptible to land clearing. This is especially true of *V. compacta* which is in danger of extinction by land clearing operations in the Otways.

More About Mud-mats (*Glossostigma* spp.)

by

J. H. Willis

In the *Victorian Naturalist* **87**: 168 (June, 1970), I recorded an unusual subalpine occurrence of the tiny, characteristically inland herb *Glossostigma drummondii*. The identification was, unfortunately, hasty and the presence of only *two* (instead of four) stamens in the almost microscopic flowers had been overlooked; the flower stalks also are shorter than the leaves, *not* longer as in typical *G. drummondii*. It is now believed that the little mud-plant found last January by Mr. Keith Rogers, in boggy parts of Forlorn Hope Flat (at about 4,000 ft. alt.), is not *G. drummondii* Benth. at all but *G. spathulatum* Arn. — a completely new record for Victoria!

The latter species is presumed to range very widely from S.E. Australia to North Queensland, Ceylon, India and tropical Africa, but is not yet reported from New Guinea. It was first described, and figured in colour, by Dr. Richard Wight in W. J. Hooker's *Botanical Miscellany 2*: 101, suppl. t. IV (1830) under the name *Microcarpaea spathulata*. Wight had seen this plant only twice, near Madras and Negapatam along the Carnatic coast; but his name has been rendered illegitimate because he included in synonymy the names *Peplidium capense* Spreng. and *Limosella diandra* L.—according to modern nomenclatural requirements, he should have taken up Linnaeus's epithet *diandra* and made the new combination "*M. diandra* (L.) Wight." On the other hand, Arnott's publication (1836) of the name *Glossostigma spathulatum* can be justified, even though his epithet was adopted from that of the illegitimate combination *M. spathulata* —q.v. Article 72 in the 1966 International Code of Botanical Nomenclature. In Dr. Hj.Eichler's *Supplement to J. M. Black's Flora of South Australia (ed. 2)*: 281 (1965), *G. spathulatum* is claimed to be an illegitimate name (an opinion not shared by the present writer) and is replaced by *G. diandrum* (L.) O. Kuntze; this latter name has also been adopted in Nancy T. Burbidge and Max Gray's recent *Flora of the A.C.T.* 323 (1970), wherein the species is newly recorded for the Canberra region and assigned an astonishing altitudinal range—from the bank of Lake Burley Griffin to Mt. Gingera (at 6,000 ft.).

It is quite uncertain that the name *G. diandrum* can be applied to any Australian populations of *Glossostigma. Limosella diandra* L. was based upon a (presumtively) South African collection in such poor condition that even Thunberg and later Bentham could not be sure of its identity, and subsequent floras of the Cape Province have all omitted *Glossostigma.* Can we apply *G. spathulatum* to Australian mud-mats having a 3-lobed calyx and only 2 stamens? Differences are certainly apparent between Wight's original plate (with good analytical details) and the little mountain plant discovered by Mr. Rogers in the Forlorn Hope Flat area of N.E. Gippsland. For instance, Wight depicts a rosy-pink corolla about twice as long as the calyx, with relatively *slender* corolla-tube and *numerous* ovules, whereas the Victorian plant has a broad corolla-tube with lobes hardly exceeding the calyx and a few-seeded ovary. Australian floras describe the corolla of *G. spathulatum* as blue, not pink, but this may be due to a colour change during drying—as with the so-called "Blue" Boronia *(B. caerulescens),* where flowers are bluish only in the dried condition. For the present, *Glossostigma spathulatum* remains the most acceptable name for our little bistaminate mud-mat of the mountains; but the need for a competent revision of the whole genus, backed up by extensive field studies, is equally obvious.

* * * *

Rediscovery of *Pomaderris obcordata* in Victoria

To Mr. Keith Hately, National Park Ranger at Kiata, goes the credit for a recent botanical discovery of great interest. In July, 1969, while examining part of the Little Desert near the South Australian border (in Moray Parish) he collected a flowering fragment of what has proved to be *Pomaderris obcordata* Fenzl, not seen in Victoria for the past 112 years; the shrub was about 3 ft. high and growing in stony ground. *P.obcordata,* which ranges from Western to South Australia, is not infrequent on Eyre and Yorke Peninsulas, Kangaroo Island and the S.E. coast (Guichen Bay, etc.); it is unique among eastern representatives of this genus by virtue of its triangular, prominently 2-lobed leaves about ½ inch long. In Melbourne Herbarium is an old collection made by C. Wilhelmi in January, 1857, and labelled simply "Grampians." Baron von Mueller included the species in his *Key to the System of Victorian Plants* p. 257, fig. 61 (1886-88); but the record has been completely overlooked since that date — it was omitted from both editions of the F.N.C.V. plant census (1923 and 1928) and from Ewart's *Flora of Victoria* (1931).

Its re-appearance in the far west of our State is paralleled by that of the equally remarkable *Spyridium spathulatum* (Big Desert, Aug. 1965) and strengthens the case for a permanent reserve in this sector of the Little Desert.

—J. H. Willis

Changes in the Nomenclature of Two Endemic Tasmanian Plants

by

WINIFRED M. CURTIS

SPYRIDIUM OBCORDATUM (Hook. f.) W. M. Curtis, comb. nov.

Cryptandra obcordata Hook. f. *Flor. Tasm. 1*: 71 (1855);

Spyridium serpyllaceum (Reissek & F. Muell.) F. Muell. *Fragm. Phyt. Aust. 3*: 80 (1862) — nom. illegit.

The new combination is needed because, under the name *Spyridium serpyllaceum*, Mueller included both *Trymalium serpyllaceum* Reiss. & F. Muell. in *Linnaea 29* : 280 (1858) and *Cryptandra obcordata* Hook. f. *Flor. Tasm. 1* : 71 (1855) in synonymy.

OLEARIA TASMANICA W. M. Curtis, nom. nov.

Eurybia alpina Hook. f. in *Lond. J. Bot. 6* : 106 (1847)

Olearia alpina (Hook. f.) W. M. Curtis *Student's Flor. Tasm.*: 304, 463 (1963), non *Olearia alpina* J. Buchanan in *Trans. New Zeal. Inst. 19*: 215 (1887).

When making the new combination, *Olearia alpina*, I regrettably overlooked Buchanan's prior use of the name for a New Zealand species.

Readers' Nature Notes and Queries

The Editor has exhausted the supply of these notes. It is up to readers to rectify this matter.

These notes come from Ellen Lyndon, in Leongatha, Victoria.

Fleas on Bush Rat

On 2/2/70 a party walking near a creek in bush country at Yinnar South, near Morwell, were examining the thick matted ground cover of Twining Glycine, when a small rodent ran out of it. One man was able to cover it with his palm and pick it up, holding it upside down for inspection. It seemed weak but struggled and squeaked and bit vigorously at the nearest finger. The chubby face, longish tail and pale feet indicated, to me, the Allied Rat, Rattus fuscipes, a juvenile specimen about half adult size. The odd thing about this rat was its extraordinary infestation with large fleas. These at once began to vacate the fur, scramble off the hand and drop to earth. We are wondering if the small rat was weakened by so many fleas, or, alternately, are fleas attracted to an animal that is perhaps sick and weakening from other causes?

Unusual Nesting Material?

Along the beach at Venus Bay, near Tarwin Lower in South Gippsland, we picked up a small cupped nest, probably that of the White-fronted Chat. It was largely composed of long black wiry strands of vegetable origin, not unlike horsehair in appearance. No one in the party recognised this material so a sharp eye was kept open for anything of a like nature. It was eventually traced to clumps of the Knobby Club rush, Scirpus nodosus, from which the sand had eroded, leaving the hairy root systems exposed and loose. Woven into the shape of the nest made a tough and resilient framework.

The Turn of the Tide

On Monday, 8th June, 1970, the F.N.C.V. had the pleasure of being addressed by Mr. Ian G. Wallis of the Monash University Westernport Bay Research Team. After showing a color documentary, Mr. Wallis spoke on the problems associated with the rapid industrial development taking place around Westernport Bay and its effects on the natural balance now maintained in ecological and hydraulic systems.

The following is a précis of the address, taken from notes supplied by Mr. Wallis, to whom the writer expresses appreciation and acknowledgement.

Westernport Bay is a large tidal estuary, where, over a long period of time, two delicately balanced systems have evolved to form the pleasant area of islands, sandy beaches, rocky foreshores, salt marshes and mangrove swamps of to-day.

This will be altered and possibly totally destroyed in less than ten years if further detailed research is not undertaken to determine the tolerance of pollution on the environment. The Monash University Team has considered the changes made as part of industrial development in terms of disturbance to the two existing natural systems.

During the winter months, sand and crushed shells are removed from the beaches by storms and wave action to form sand bars. These are returned to rebuild beaches in milder weather. The currents on the shores and in the channels, keep sediment moving in and out of the Bay with each tidal cycle and so a balance is achieved.

Dredging of channels and reclamation of mudflats, could cause serious disturbance to this balance. The shape of the Bay could be altered, resulting in a decrease of the volume of water moving in and out of the Bay and thus changing its flushing characteristics. Tests conducted to estimate the effluent disposal have shown that a build-up will occur, as currents sweep it back into the channels.

Disturbance to the hydraulic system will in turn affect the ecological balance. This system, wherein plants and animals are dependent on each other for food and shelter, if destroyed at one point, could lead to total destruction of the whole. The food source of many forms of marine life would disappear if the mudflats were eroded. The teeming millions of minute animals living in the mud, provide food for higher forms of life, which are in turn, food for fish. The fish are in turn the food for seals and penguins, living at the Bay entrance.

The mangrove areas are very important in the ecological scheme, as they stabilise mudbanks. Mangroves are easily destroyed by the effects of dredging and oil slicks. An example of this can be seen in the deterioration of the Williamstown beaches, where the last mangroves disappeared in 1956.

Mr. Wallis stated that Westernport Bay would cease to be a recreational area if immediate steps were not taken to safeguard the Bay. He suggested that French Island should be retained as a reserve, as it is the last example of natural heathland, and any causeway construction to the island could create problems with flushing. Consideration should be given to the discharge of effluent into the ocean and not the Bay, through the South West Sewerage System.

If our assets are to be protected, a large capital outlay will be required, creating further problems of the rise in cost of products. The industries and local Government bodies in the area have shown interest in the pollution problem, but are inclined to take the view that "you show us that effluent is causing damage and we'll do something."

Suggestions were made by Mr. Wallis that natural history clubs could be of assistance by conducting botanical surveys and gathering any relevant information relating to the environment.

The 26-minute color documentary "The Turn of the Tide," which was produced by Mr. Wallis, illustrated the effects of pollution in the Bay. The film also depicted the Research Team conducting tests on the effluent dispersal, the movement of sediment and correlating their findings.

Mr. Wallis is to be congratulated on the fine quality of the film and it should do much to promote public interest in the preservation of Westernport Bay.—Edna King.

The Distribution of Epiphytes on Beech (*Nothofagus cunninghamii*) Trees at Mt. Donna Buang, Victoria

by

Dr. H. Ashton* and R. McCrae*

The vertical zonation of bryophytes, lichens and ferns was sampled on very recently fallen Beech trees at 3,000 ft. in 1963 on Mt. Donna Buang, Victoria. The site is wet, frequently mist-laden, and being on a steep eastern slope, it receives little direct sunlight on hot summer afternoons.

Beech trunks are frequently gnarled and corrugated and the original plates of bark from younger stages may adhere between multiple fissures. There are therefore many microhabitats for epiphyte establishment, especially amongst the convoluted roots, burls and buttress-like swellings. Some aspect differences were observed on the tree trunks in more exposed positions, but these were not specifically studied.

1. *The relationship between tree girth at breast height and butt epiphytes.*

In general the number and profuseness of epiphyte species increases with the size of the trunk. Four to five species were found on trees less than 1 ft. g.b.h. up to heights of 6 ft. However, on trees of 8-10 ft. girth this number was doubled (Table 1). This relationship is probably due to the greater diversity of habitat on the thicker-barked, larger and older trees, but it could also be related to the minimal area for the epiphyte communities.

In general the larger and more frondose liverworts were found at lower levels on the trunk where fern establishment was also more common. The finger fern, *Ctenopteris billardieri* was found at the lower levels and, also, occasionally the soft tree-fern *Dicksonia antarctica.* The smaller trunks were often surrounded by dense ground ferns (*Polystichum proliferum*) which cast considerable shade around the butt. The large tree bases, on the other hand, tended to be relatively free of ground ferns. There is therefore a large variation in local butt microclimate. The quantity of trunk-flow, its seepage down furrows and its retention in the thicker bark and humus accumulation in crevices are added complications to the microhabitat.

In general the butt communities were dominated by *Dicranoloma billardieri, D. menziesii, Bassania adnexa* and *Plagiochila fasciculata* with the lichens *Sticta glabra* and *Stereocaulon ramulosum* forming conspicuous patches. The liverwort *Tylimanthus tenellus* was often quite common at the lower levels. The lower strata of the epiphyte communities consisted of low mats of varying density of *Chiloscyphus echinellus, Lepidolaena magellanica, Frullania rostrata* and *Hypnum cupressiforme.*

2. *Vertical distribution of epiphytes.*

(a) Large trees.

The vertical distribution of epiphytes was recorded in small quadrats at 1-2 ft. intervals along the

*Botany Department, University of Melbourne.

south to west aspects of the trunk and branches of a tree 95 ft. in height and 8 ft. in girth at breast height. The length of the quadrats was 1 ft. but their width diminished with the taper of the tree from 18 inches at the butt to 9 inches in the mid-trunk, 3 inches in the crown and ¼ inch in the fine branches. Cover of species was estimated on the Braun Blanquet* scale of + to 5.

The results in Figure 1 show that the frondose butt-community was dominated by thick mats of the liverworts *Bazzania adnexa, Tylimanthus tenellus,* and the moss *Dicranoloma billardieri.* The epiphyte zone of the trunk space consisted of a complex mat and lichen community dominated by *Frullania rostrata, Hypnum cupressiforme* and the lichens *Sticta glabra, Parmelia pertusa* and *P. billardieri, Sphaerophorus tener* and *S. melanocarpa.*

The change to this community roughly corresponded to the level of the ground-fern canopy. Within the mat and the lichen zone there is a gradation of both the species and their abundance. In this zone *Cladia aggregata* tends to occur at lower levels and *Metzgeria furcata* at higher levels. Some feet below the commencement of the crown, small plants of the moss *Leptostomum inclinans* also occur.

The crown region microhabitats are complicated by the accumulation of humus in the angles of the branches. On the trunk, main branches and especially the branch angles, the epiphyte community is dominated by cushions of *Leptostomum inclinans* (up to 3-6 inches in diameter) and mats of *Hypnum cupressiforme.* The lichens *Parmelia physodes, P. billardieri* and *P. pertusa* are also common. This community continues on to the moderately small stems 3-4 inches in diameter on both the main trunk and the lateral branches. On the latter the *Leptostomum* cushions are situated on the upper side and the fronds of *Hypnum* trail down either side in long whisps.

On the finer branches the community becomes more open and consists of tufts of *Leptostomum inclinans* and *Ulota membranacea* with small colonies of *Parmelia pertusa* and *Usnea australis.* On the ultimate branches only sparse, simple, erect thalli of *Usnea australis* occur with occasional crustose lichens, *Lecidea cinnibarina* and *Phyllectella* sp.

(b) Small trees.

Small trees 10-23 ft. in height show a similar pattern to the large trees, but in the small tree the zonation of species is greatly foreshortened. Small colonies of frondose bryophytes occurred up to 5 ft. on the 23 ft. tree and 2 ft. on the 2 ft. tree. The trunk community again is composed of *Frullania rostrata, Hypnum cupressiforme* and *Sticta* species. *Leptostomum inclinans* cushions are not common on the crowns of the 23 ft. tree and are absent from the 10 ft. tree. The fine branch and twig zone contains *Usnea australis* and *Hypnum cupressiforme* and "whitewash" crustose lichens (*Phyllectella*) (Fig. 2). In general, the conspicuous *Parmelia* spp. and *Ulota* components of the tall crowns of the forest canopy are missing.

(c) Corticolous succession.

The earliest colonizers are found on 3-year-old branches and are chiefly *Usnea australis* and "whitewash" crustose lichens. At this stage the *Usnea* thalli are only 1 mm. high.

* (+ = 0-1%, 1 = 1-5%, 2 = 5-25%, 3 = 25-50%, 4 = 50-75%, 5 = 75-100%).

On 5-6 year branches they are 2-5 mm. in height and are associated with small *Parmelia pertusa* and *Ulota membranacea* colonies. From about 10-13 years *Usnea* is branched 10-15 mm. high and associated with *Parmelia billardieri* and *P. lugubris.* From 13-18 years on thicker branches, the crown community is well developed with the occurence of *Hypnum cupressiforme* and *Frullania rostrata* (Fig. 3). *Usnea* and the crustose lichens virtually disappear. In general, the lower branches establish a crown-type community a few years earlier than the upper branches and the horizontal branches develop a much more vigorous community than the vertical branches. The rate and extent of development is likely to be greatly affected by the local microclimate in the crown. Succession to cushion moss communities on horizontal branches usually only occurs on the upper surface. The lower areas are shaded and drier and bear only simple algal or soredial lichen communities. It is possible that the cushion community dominated by *Leptostomum inclinans* becomes unstable with age and cannot fully recolonize the vertical trunk once the earlier crown branches have fallen. If this is so, it could help to explain the development of a lower and more open mat community dominated by *Hypnum* and *Frullania* in the clear bole region. The bark flakes of the original young stem may still adhere to the mature trunk and may bear crustose lichens such as *Pertusaria* which may be relics of the earlier communities. It seems that succession in the true sense does not proceed beyond the branch stage since new surfaces are being constantly created by expanding bark furrows of the trunk.

The Relationship between Epiphytes and Environmental Factors:

The documentation of the Beech tree environment within the forest would have been of great interest. However, it was only possible to investigate a few relevant factors.

Bark thickness on the large tree ranges from 8-9 mm. on the butt to 5-6 mm. on the mid trunk, to 3-4 mm. in the crown and 1-2 mm. in the small branches. The twigs have a bark thickness of only 0.2-0.8 mm. The moisture content of the outer bark in winter was near saturation at 70-79% O.D.W. in the crown and 53-69% at the butt. It is likely, however, that the lower bark would have a greater moisture storage due to its greater thickness. In addition, the greater shade, lower temperatures and windspeeds at lower levels in the forest trunk space would be conducive to the development of a marked gradient of humidity.

In order to test the relative resistance of various crowns and butt species to desiccation, several fronds and thallus pieces of different species were suspended over concentrations of sulphuric acid such as to provide relative humidities of 0, 25, 50, 75% at 6°, 20° and 32°C. The epiphytes were exposed to these conditions for 3, 12 and 24 hours then re-moistened and their condition assessed qualitatively on a 3 point scale from green, partly brown to completely brown. The results showed that the species from the butt habitat — *Bazzania adnexa, Cyathophorum pennatum, Dicranolama billardieri, Lepidolaena magellanica* and *Sticta glabra* were much more sensitive to desiccation than the trunk and crown species *Hypnum cupressiforme, Frullania rostrata, Leptostomum inclinans* and *Cladonia aggregata.*

Even desiccation at 75% discriminated between the two groups. At 50% R.H. damage to both groups increased but the differences remained very marked. Damage at 25% was greater again, but beyond this no increase occurred in the aggregate assessment.

Temperature during desiccation had a marked effect on the damage sustained. At 32°C damage was distinctly greater than at 20°, but little difference occurred at 20° and 6°C. Damage increased greatly from 3 to 12 hours desiccation thereafter little further damage occurred.

The results indicate that *Cyathophorum pennatum* is the most sensitive species tested, followed by *Lepidolaena magellanica, Bazzania adnexa, Dicranoloma billardieri* and *Sticta delisea* in that order. The most resistant species tested was *Cladia aggregata* followed by *Leptostomum inclinans, Frullania rostrata* and *Hypnum cupressiforme.*

It is likely that resistance to desiccation is an important feature in the

Figure 1.

ecology of epiphytes. The larger frondose species are unable to transport water internally from the substrate and are reliant on free water and the high humidity of the air for their continued survival. The killing or continual damaging of the larger species could permit the smaller and often more resistant species to compete and survive. Epiphytes are often sensitive indicators of microclimate; further research on their behaviour would be very rewarding.

Summary

The epiphytic communities on Beech trees (*Nothofagus cunninghamii*) can be divided into butt, trunk, crown and twig communities. Within and between any zone, gradations of species occurrence and profusion can be observed. Corticolous succession can be postulated for the development of communities on branches. A desiccation experiment suggested that marked differential resistance occurs between species normally found on the butt and trunk-crown regions. Such differences in behaviour could be decisive factors in the zonation of epiphytes on the trunk-space of the forest.

Acknowledgements

We gratefully acknowledge the help with identifications of lichens by Mr. R. Filson, Liverworts by Mrs. A. E. Hodgson and mosses by Dr. I. Stone. The senior ecology class of 1963 of which one of us was a member (R. McCrae) assisted with some of the field work.

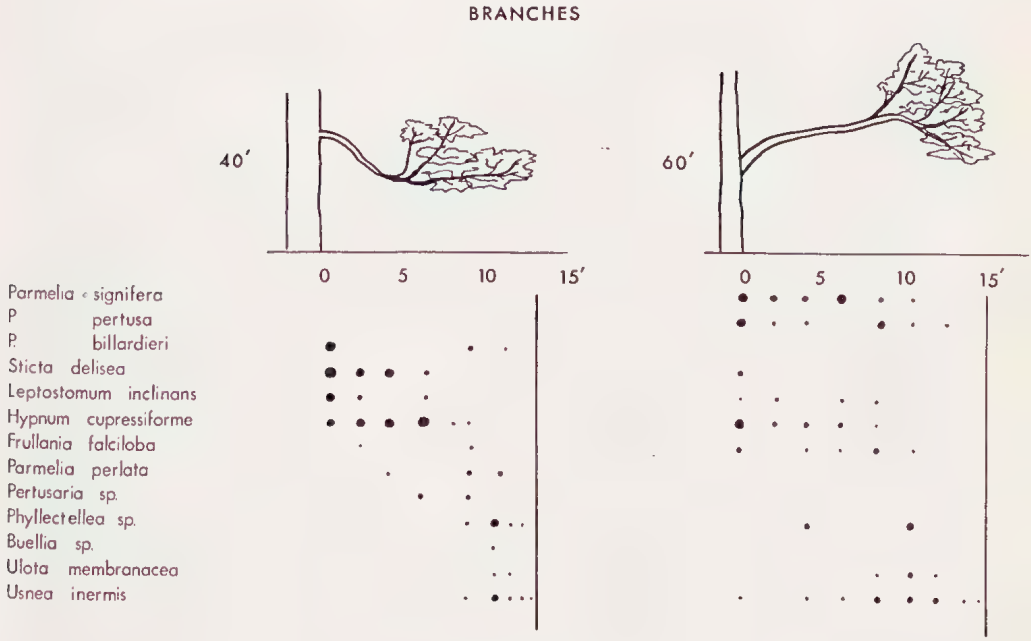

Figure 2.

Figure 3.

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GEOLOGY GROUP EXCURSIONS

Saturday, 5 September—To Eden Park Fossil Beds. Leader: Mr. Barry Cooper. Leave Lalor Station at 2.10 p.m.

Sunday, 11 October—To Heathcote and district (previously advertised for 9th August.)

Sunday, 8 November—To Kinglake. Leader: Mr. George Carlos.

Transport is by private car. Spare seats are usually available for those without their own transport. **Unless otherwise indicated** excursions leave from the western end of Flinders Street Station opposite the C.T.A. Building at 9.30 a.m.

TABLE 1

Epiphytes on Beech Butts of different size.

Ht.	0 – 2 ft.					$4\frac{1}{2}$ – 6 ft.				
GBH	0–1	3–4	6–7	8–9	>10	0–1	3–4	6–7	8–9	>10
Tylimanthus tenellus	x		x	x						
Dicranoloma menziesii	x	x		x			x		x	
Dicranoloma billardieri	x		x	x			x	x	x	
Acrobolbus rotundifolius		x	x	x	x	x	x	x		x
Hypnum cupressiforme						x				
Sticta Glabra			x		x	x	x	x	x	
Sphaerophorus melanocarpa				x		x	x	x	x	
Plagiochila fasciculata		x	x	x			x	x	x	
Frullania rostrata		x			x		x	x	x	x
Cladia aggegrata		x		x	x		x	x		
Bazzania adnexa			x	x	x				x	
Ctenopteris billardieri			x	x	x					
Chiloscyphus echinellus			x		x			x		
Radula sp.							x			x
Stereocaulon ramulosum					x		x			
Lepidolaena palperifolia								x	x	
Sphaerophorus tener									x	x
Lepidolaena magellanica				x	x					
Lepicolea scolopendra									x	
Lophocolea australis									x	
Pertusaria valata										x
Metzeria sp.										x
Rhizogonium miniodes										x
Cladonia squamata					x					
Dicksonia antarctica					x					

Footnote for table 2 (pages 260-261).

ORDER OF SPECIES:

Crown species

(a) Hypnum cupressiforme

(b) Frullania rostrata

(c) Leptostomum inclinans

(d) Cladia aggregata

Butt species

(e) Cyathophorum pennatum

(f) Dicranoloma menziesii

(g) Lepidolaena magellanica

(h) Stereocaulon tener

(i) Bazzania adnexa

TABLE 2

Damage to Epiphytes at Different Temperatures and Relative Humidities.

x Damage Slight or none.

xx Damage Moderate.

xxx Dead.

Species (a) – (i): see footnote page 259.

Rel. Humidity Temp.	Time	0% R.H.		25% R.H.		50% R.H.		75% R.H.		100% R.H.	
		Crown	Butt	Crown	Butt	Crown	Butt	Crown	Butt	Crown	Butt
32° C	3 hours	(a) xx	(e) xxx	xx	xxx	xx	xxx	x	xx	x	x
		(b)	(f) xxx	x	x		x	x	x	x	x
		(c) xx	(g) xxx	x	xx	x	xx	x	xx	x	x
		(d) x	(h) xx	x	x	x	x	x	x	x	xx
			(i) xxx		xx		xx		x		x
	12 hours	(a) xx	(e) xxx	xxx	xxx	xxx	xxx	x	xxx	x	x
		(b) xx	(f) xx	xxx	xxx	xxx	xxx	x	x	x	x
		(c) x	(g) xx	xx	xxx	xxx	xxx	x	xx	x	x
		(d) xx	(h) xxx	xxx	xxx	xxx	xxx	x	x	xx	xx
			(i) xx		xxx		xx		x		x
	24 hours	(a) xx	(e) xxx	xx	xx	xx	xxx	x	xxx	x	x
		(b) xx	(f) xx	xx	xx		xx		xx	x	x
		(c) x	(g) xx	x	xxx	x	xx	x	xxx	x	x
		(d) x	(h) xx	xx	xx	x	x	x	xx	xx	xx
			(i) xx		xx		xx		xx		x

20° C	3 hours	(a) x	(e) xx	x	xx	x	x	x	x	x	x
		(b) x	(f) xx	x	x	x	x	x	x	x	x
		(c) x	(g) xx	x	xx	x	x	x	x	x	x
		(d) x	(h) xx	x	x	x	xx	x	x	x	x
			(i) xx		x		x		x		x
	12 hours	(a) x	(e) xxx	x	xxx	x	xx	x	xx	x	x
		(b)	(f) xx	xx	xx	x	x	x	x	x	x
		(c) x	(g) x	x	xx	x	xx	x	xx	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		xx		x		x
	24 hours	(a) x	(e) xxx	x	xx	x	xx	x	x	x	x
		(b)	(f) xx	x	xx	x	x	x	x	x	x
		(c) x	(g) xxx	x	xx	x	xx	x	x	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		xx		x		x
6° C	3 hours	(a) x	(e) xx	x	xx	x	xx	x	x	x	x
		(b) x	(f) xx		x	x	x	x	x	x	x
		(c) x	(g) xxx	x	xxx	x	x	x	x	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		x		x		x
	12 hours	(a) xx	(e) xxx	x	xxx	x	xxx	x	xx	x	x
		(b)	(f) xx		xx		xx	xx	x	x	x
		(c) x	(g) xx	x	xx	x	x	x	xx	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		x		x		x
	24 hours	(a) xx	(e) xxx	xx	xxx	x	xx	xx	x	x	x
		(b) xx	(f) xx	x	xx	x	x		x	x	x
		(c) x	(g) xxx	x	xx	x	xx	x	x	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		xx		x		x

Reptiles of the Hattah District Victoria

by Hans Beste

A total of fifty-two days was spent by the writer and an additional party of two in the Hattah region of N.W. Victoria, during three fieldtrips between 16 September and 4 December 1969. A particular effort was made to locate and identify as many reptiles as possible, and although 26 species were found in a rather restricted area, these are by no means the only reptiles that have been found in that part of the state.

The areas studied were a 180,000 acre leasehold at Hattah, the environs of Hattah, and a freehold of 1,300 acres on the River Murray.

The first two areas can be described roughly as mallee with open plains, and the third as River Red Gum flood plains. The weather was mostly mild during the time spent in the area, which would have contributed to the fact that reptiles were sometimes rather scarce, and that some species that are known to be in the area were not sighted at all.

The elapine generic names are those as adopted by P. A. Rawlinson (1966) i.e. (Kinghorn 1956) and subsequent changes in scincidae (pers. comm. Rawlinson). Not all of the species found have common names, but wherever possible a common name is given, without following any particular author.

The Title Block illustrates the gecko **Diplodactylus tesselatus.**

	Area where found (*See Fig. 1*)
Chelonia	
Chelyidae	
Chelodina expansa (Broad-shelled Tortoise)	3
Chelodina longicollis (Long-necked Tortoise)	3
Emydura macquarrii (Macquarrii Tortoise)	3
Squamata	
Lacertilia	
Agamidae	
Amphibolurus barbatus (Bearded Dragon)	1, 2, 3
Amphibolurus fordi (Mallee Dragon)	1
Amphibolurus muricatus (Jacky Lizard)	1, 2
Amphibolurus pictus (Painted Dragon)	1, 2
Physignathus gilberti (?)	1

GEKKONIDAE

Diplodactylus strophurus intermedius	2
Diplodactylus tesselatus	3
Gehyra variegata (House Gecko)	1, 2, 3
Diplodactylus damaeus (Beaded Gecko)	1, 2
Phyllodactylus marmoratus (Marbled Gecko)	3

PYGOPODIDAE

Delma fraseri (Fraser's Legless Lizard)	1
Lialis burtonis (Burton's Legless Lizard)	1, 2

SCINCIDAE

Ablepharus boutonii (Wall Lizard)	3
Ablepharus lineoocellatus	1, 2, 3
Egernia inornata (Desert Skink)	1
Ctenotus lesueurii (Striped Skink)	1, 2
Ctenotus sp? (a specimen of an undescribed species was collected)	1
Tiliqua occipitalis (Western Bluetongue)	1
Tiliqua rugosa (Shingleback)	1, 2, 3

VARANIDAE

Varanus gouldii (Gould's Sand Goanna)	1, 2, 3
Varanus varius (Lace Monitor)	3

OPHIDIA

ELAPIDAE

Demansia textilis (Common Brown Snake)	1, 2, 3

TYPHLOPIDAE

Typhlops australis	2

Acknowledgements:

The author wishes to thank the following people for the help that they have given him and his party, while doing the field study and by helping with the identification and naming of some of the specimens.

Mr. and Mrs. H. McArthur, for giving kind permission to camp on their properties and for the assistance which they gave us during this time.

Mr. P. A. Rawlinson, for helping with the identification and naming of some of the difficult specimens.

Mr. J. Coventry of the National Museum, Melbourne, for suggesting methods of finding certain species and without whose help this list may well have been shorter.

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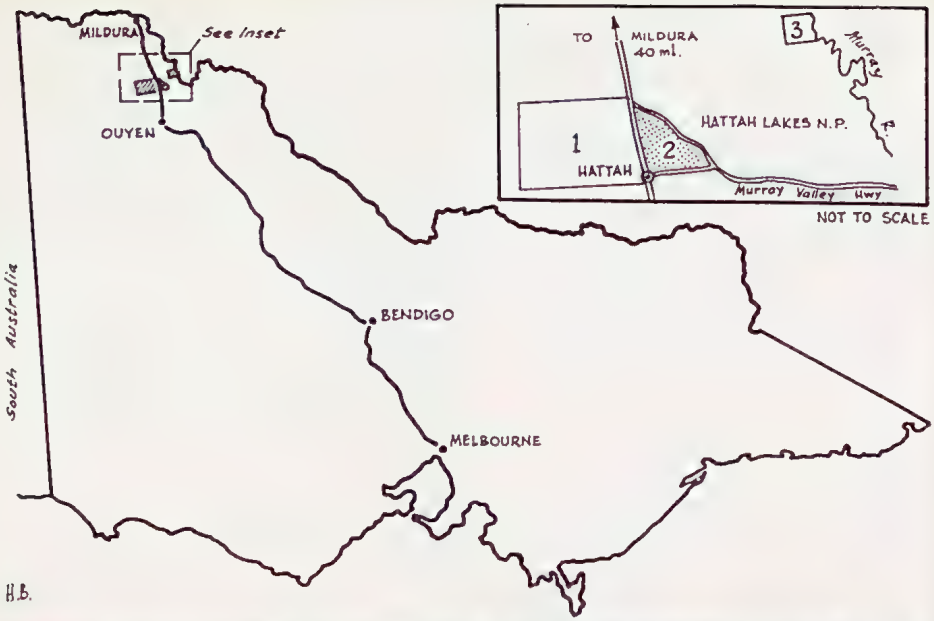
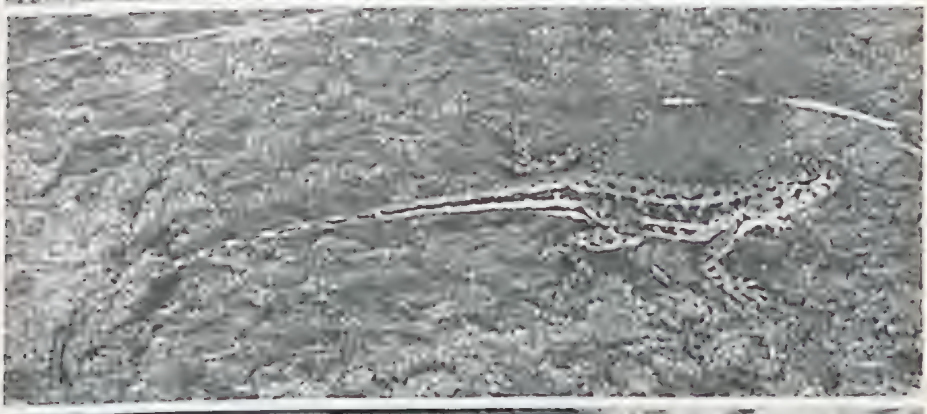


Figure 1. Map showing areas 1, 2, 3.

Plate 1.
Dragon: *Physignathus gilberti.*

Plate 2. Gecko: *Diplodactylus damaeus.*
Plate 3. Dragon: *Amphibolurus fordi.*
Plate 4. Gecko: *Diplodactylus strophurus intermedius.*
Plate 5. Blind-Snake: *Typhlops australis.*



A Diuris Hybrid from the Melbourne Area

by

P. Uhlherr

A hybrid of *Diuris* — probably *D. longifolia* x *D. pedunculata* — was discovered by Mr. and Mrs. D. Dunn in the late Spring of 1967. It was found again in 1968 and 1969 in three separate localities of the Dandenong Ranges and the Mornington Peninsula. The author was able to study plants in the field in two of these localities during 1968 and 1969. The flowers do not conform to any species known to the author. The conclusion that a hybrid is involved is by no means certain and is based on floral characteristics and on the abundance of the two assumed parents in all the localities and the relative scarcity of the plant under discussion. Usually about 3 to 6 plants have been found in clusters among a large number of *D. longifolia.* In one area, three such clusters were found. The *D. pedunculata* was normally some hundreds of feet removed. This could possibly indicate that the latter species is the pollen donor while the former is the recipient.

The flowers of the hybrid are among the most impressive of the genus, the spreading habit of the petals giving the flowers a very large appearance. The floral characteristics are more or less intermediate between those of the supposed parents, as can be seen from Figure 1. Some variability has been observed, but not more than in *D. pedunculata* itself.

The labellum has two rather obscure basal ridges, which are slightly pubescent or glandular (to a lesser degree than in *D. pedunculata*), as shown in Figure 2, K and L. The side lobes have irregular margins as in *D. pedunculata,* but the ratio of their length to that of the mid-lobe is much greater than is that species and agrees more nearly with the ratio found in *D. longifolia.* (Figure 1; D, E, F). The mid-lobe may be entire except for a small notch in the tip — less pronounced than in *D. longifolia* — or it may be rather irregular near its apex. This last feature is not found in either parent.

The petals are longer than in either parent, and the ratio of claw length to lamina length is very similar to that found in *D. pedunculata* (1/4 to 1/5), being somewhat less than in *D. longifolia* (1/2 to 1/3) (Figure 1: G. H. J.). The petals are almost horizontally spreading as in *D. pedunculata.* However, they do not point forwards as in that species, but rather are slightly recurved towards the ovary (Figure 1: A, B, C).

The lateral sepals are 1½ to 2 times as long as those of either parent and are not at all petaloid. They have inrolled margins and terminate in fine points (Figure 2; M, N, O). The dorsal sepal resembles that of *D. pedunculata* in shape, but is somewhat wider and longer. It is reflexed away from the column to a greater extent than in that species. The margins near the apex may be irregularly toothed or entire, and the tip is apiculate (Figure 1; G, H, J).

The column of the hybrid resembles that of *D. longifolia* in that the wings and the anther both exceed

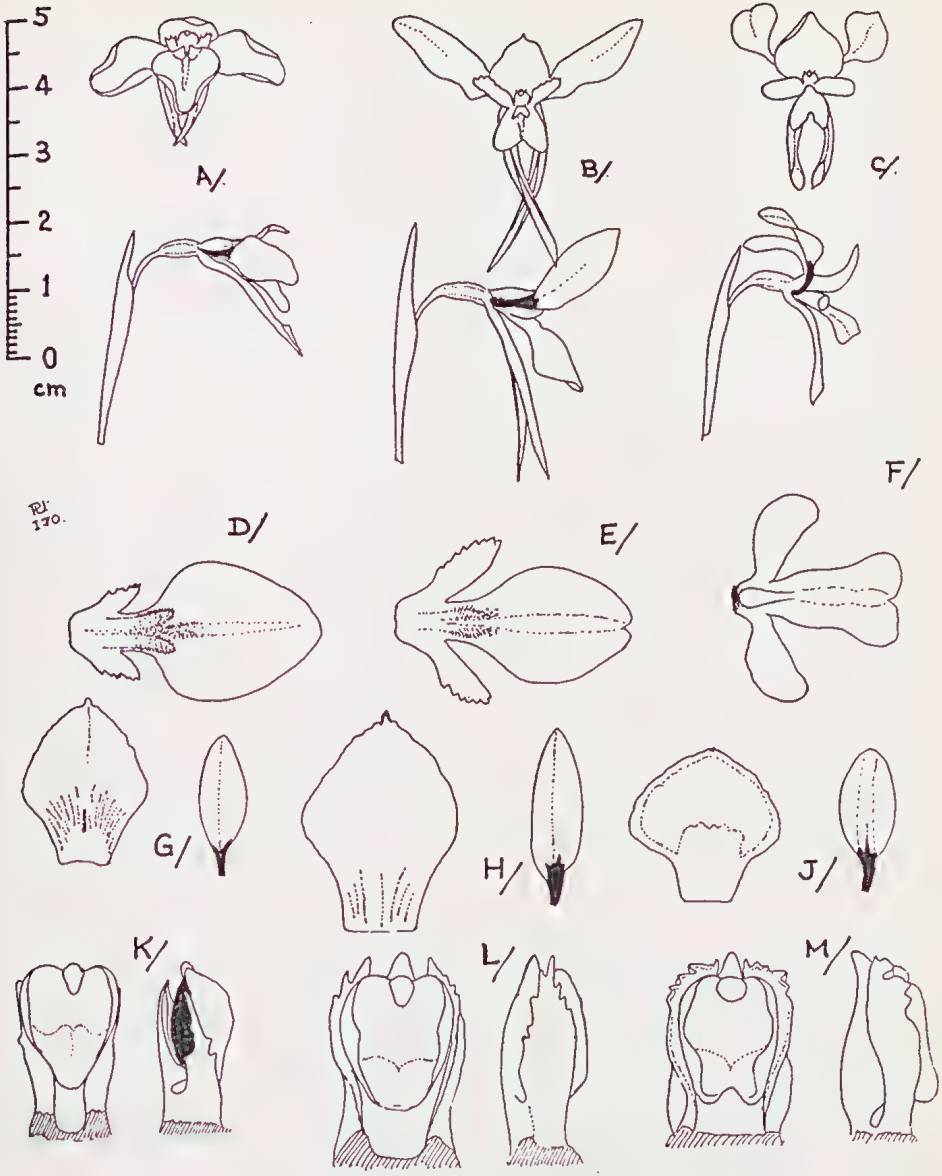


Figure 1

	D. pedunculata (left)	Hybrid (centre)	D. longifolia (right)
flower front and side (X1)	A	B	C
labellum flattened (X2)	D	E	F
dorsal sepal flattened (X2) petal flattened (X1)	G	H	J
column front and side (X6)	K	L	M

the rostellum in height, whereas in *D. pedunculata* both wings and anther are lower than the rostellum. However, the stigma shape is closer to that of *D. pedunculata* in that the protruding swellings at the base are lacking (Figure 1; K, L, M). The shape of the anther differs from that of both parents and is rather narrower (Figure 2; A, B, C). The pollinia, with viscidia, of the two parent species are shown in Figure 2; D, G and F, J. The pollinia of the hybrid could not be removed from the anther cap, which was rolled quite tightly around the very fragile, mealy pollen masses. The pollen was, however, easily separated from the viscid disc. This seems to indicate that perhaps the hybrid is incapable of pollination except with pollen from the parent species. The pollen of hybrid flowers certainly cannot be removed by an insect. The stigma, however, appears to be quite normal, in that it is viscid and has a tube to the ovary, which contains apparently normal ovules. The hybrid pollen masses, enclosed in the anther cap, are shown in Figure 2; E and H.

The flower colour is yellow with a few rather pale, reddish-brown streaks or blotches. The dorsal sepal is streaked near its base, while the petals have broad but pale central streaks. The labellum mid-lobe is blotched, while the side lobes are streaked. The lateral sepals are wholly green.

Some plants were seen with flowers having a diameter of 55 mm. —considerably larger than either parent; however, most flowers measured about 40 mm. Plant height and robustness are as for *D. longifolia.* Also the underground organs resemble those of *D. longifolia,* which has a number of long, thick and fleshly roots radiating from the base of the stem. The point of attachment is constricted and extremely fragile. The rather large, more or less globular tubers of *D. pedunculata* are absent. Instead, the greatly elongated tubers are almost horizontally disposed (Figure 2; P, Q).

The flowering period is mid-October to early November.

Plate 1.

Diuris hybrid, centre; with *D. pedunculata,* left; and *D. longifolia* right.

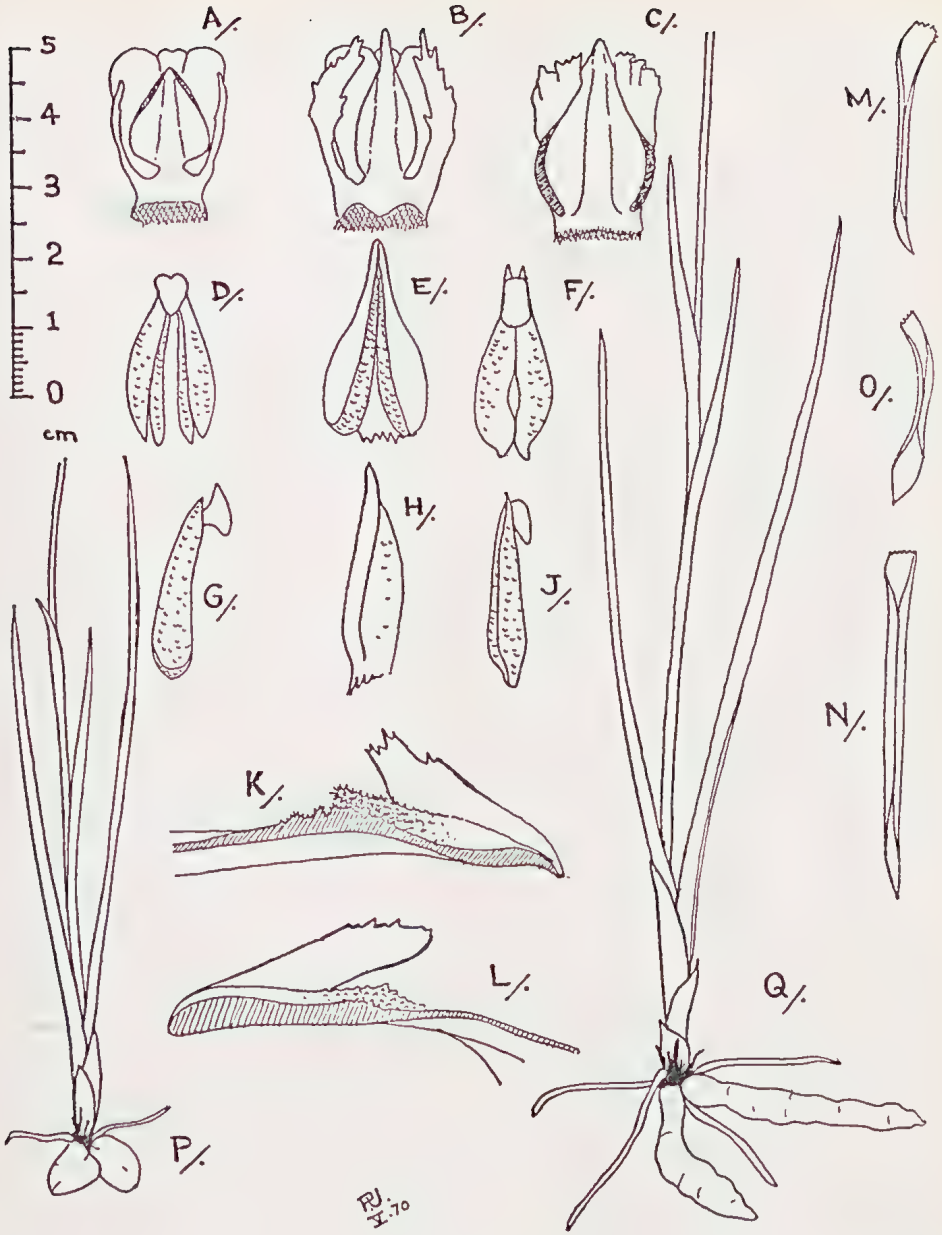


Figure 2

	D. pedunculata	Hybrid	D. longifolia
column rear (X6)	A	B	C
pollinia front and side (X9)	D/G	E/H	F/J
labellum base in longitudinal section (X5)	K	L	—
lateral sepal (X1½)	M	N	O
plant (X½)	P	Q	Q

Marsupials Caught in Pollen Traps at Wilson's Promontory

by

J. H. Hope* and G. S. Hope†

During a study of pollen fallout in Wilson's Promontory National Park, several small marsupials were unintentionally caught in pollen traps. Since there are few recent records of small mammals in the National Park, it is worth noting these occurrences. Also, the unusual method of trapping leads us to suggest that naturalists in Victoria may be able to enlarge the number of records of mammal distribution by the simple expedient of collecting old bottles.

The pollen traps used in the vegetational study each consisted of a beer bottle, the base of which had been cut off with a diamond saw. The neck of the bottle was corked and the bottle placed upside-down, either partly buried in the soil or attached to a supporting frame, so that the open base of the bottle was uppermost and about 6 to 18 inches above ground level. The bottles were filled with a gylcerine solution to trap pollen blown by wind or precipitated by rain. Mercuric chloride was also added to prevent the growth of fungi. The pollen traps were placed in fifteen different plant communities on Wilson's Promontory, and were emptied and refilled at monthly intervals over a period of two years. The pollen trapping project was carried out while G. S. Hope was a research student in the School of Botany, University of Melbourne; it is reported in Hope (1968).

* Department of Prehistory

After the pollen traps had been in position for about nine months, three marsupials were found in two different traps. The traps were then covered with half inch mesh wire netting to prevent any further captures. However, two more marsupials were caught during the following year inside traps covered with mesh.

The first two marsupials caught both came from the same trap, which was situated in *Eucalyptus baxteri - Casuarina pusilla* tree heath at the start of the track leading from the main road to Lillypilly Gully. These were collected on 13 December, 1966, which means that they must have fallen into the trap sometime during the month preceding this date. Unfortunately both these specimens were lost before they had been identified. On 16 February, 1967, a specimen of *Antechinus stuartii* was found in a pollen trap in *Eucalyptus baxteri* low sclerophyll shrub woodland about 200 yds. east of Tidal Overlook. It is now in the National Museum of Victoria (NMV), registered as C9058.

All the traps were covered with mesh in March, 1967, but on 15 April, 1967, another *Antechinus stuartii* (NMV No. C8724) was collected from a pollen trap in *Eucalyptus obliqua* forest about 250 yds. from the picnic site at Lillypilly Gully. The last marsupial caught was a specimen of *Sminthopsis leucopus*

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(NMV No. C8818). It was found on 16 December, 1967, in a pollen trap in *leucopogon parviflorus - Leptospermum laevigatum* open shrubland on a coastal dune seaward of Cottars Lake, which lies at the southeastern part of the Yanakie Peninsula, just north of Darby River.

Wakefield and Warneke (1967) noted that *Antechinus stuartii* is widely distributed in both wet and dry sclerophyll forest throughout southeastern Victoria, so the discovery of this species in dry sclerophyll forest and woodland at Wilson's Promontory is not surprising. Marlow (1957) states that the habitat of *Sminthopsis leucopus* is sclerophyll forest. The pollen trap on the dune at Cottars Lake was at least one mile away from the nearest forest or woodland vegetation, but this species is known to inhabit at least one unforested island in Bass Strait, West Sister Island.

Our discovery of the ability of these two species to squeeze through narrow mesh to get inside the pollen traps parallels the records of many small mammals found trapped inside empty bottles in the British Isles. At least ten different species of mammals, mainly shrews and small rodents, have been collected from discarded bottles there (Morris and Harper 1965). Some bottles contained more than one animal, the record being held by a champagne bottle which contained the remains of fifteen individuals of four different species. It seems likely that the mammals are caught in these bottles because of the greater ease of entering a bottle than leaving by the neck, especially if the inside of the bottle is wet and slippery. Any remnants of the original contents of a bottle may act as bait, or the circular opening of the bottle mouth may attract mammals because of its resemblance to a burrow entrance. In the case of the pollen traps, the marsupials may have been attracted by the liquid inside and have fallen in while attempting to drink. The fact that two of the five specimens managed to enter pollen traps through the wire mesh suggests that the trapping was not accidental, but due to a positive effort on the part of the marsupials.

Although pollen traps are not common in the bush, empty bottles certainly are. Those most likely to trap animals are ones hidden in thick vegetation, and when these are exposed by bushfires they may be worth examining for mammal remains. In Britain many first records of species in some areas have been obtained from bottles, and the method has also produced information of mammal distribution in suburban areas. The ease with which bottles can be examined, combined with the large numbers thrown away in Australia, make this method worth investigating here.

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(Marsupialia). 2. *Vict. Nat.* **84** (3): 69-99.

Field Naturalists Club of Victoria

General Meeting

10 August, 1970

The meeting was opened by the President, Mr. T. Sault, who welcomed approximately 80 members and visitors present.

Mr. D. McInnes informed the meeting of the Nature Show arrangements and called for volunteers to assist at the Show. Attendance rosters were distributed and cards, pamphlets, car stickers, etc. made available for advertising purposes.

Exhibits:

Mr. A. Morrison — A collection of aboriginal artefacts. Sandstone grinding stones and quartzite scrapers from the George Gill Range, N.T. Hammer stones and choppers from Mt. Connor, N.T.

Mr. P. Matches — Rusty Pomaderris (*P. ferruginea*), Correa (*C. glabra*), empty cases of gall insects from the Warrandyte area.

Mr. H. Haase — Garden cultivated specimens of 2 gums (*E. crenulata* and *E. kruseana*), Cootamundra Wattle (*A. baileyana*) showing galls. Mr. Haase remarked on the number of insects infesting native plants this year and attributed this to the scarcity of birds, especially brown thornbills, their numbers apparently reduced by predatory domestic animals.

Mrs. W. Seamons — A weevil identified as Coleoptera Fam. Curculionidae, shown under microscope.

Mr. Bishop — An Ascidian shown under the Club Binocular Microscope.

Mr. T. Sault — Pond life containing Ostracods, water fleas, worms. This was from tank at home.

Mr. D. McInnes — Aquariums purchased for use at the Nature Show and for general use by members thereafter.

This years Natural History Medallion was displayed and the Secretary announced that it had been awarded to Miss Jean Galbraith who would be presented with it at the November meeting.

Copies of a Bird List of Churchill Park compiled by S. L. Bliss, a Bird List of the Little Desert and a pamphlet on the Mallee Fowl were tabled. These publications have been published by the National Parks Authority.

The death of an honorary member of the club, Miss Margaret Wigan, was announced. Miss Wigan was for many years an active club member and known to all as a warm-hearted and kindly person. Mr. J. Willis and Miss J. Blackburn both spoke of Miss Wigan's interest in birds, her trip to the Abrolhos Islands and her membership of the National Parks Association since its inception. She was the only honorary member of that Club.

Another honorary member of the club, Miss Chisholm, of Macedon, is now an inmate of the Alexandra Home at Castlemaine and members wishing to visit are welcome.

Miss M. Butchart, who has been in hospital for an eye operation is reported to be recovering very well.

The Secretary read a copy of a letter sent to the Minister of Lands regarding the preservation of the Mt. Napier area. Further correspondence on this matter indicates that there is a good possibility of this area being preserved.

Mrs. E. Lyndon of Leongatha wrote of a display by the Vermin and Noxious Weeds Board depicting the Wombat as vermin. She also sent along a ridiculous advertisement for a pest control firm in which spider webs were said to destroy paintwork.

A letter of appreciation was received from the parents of Antonia Bartlett of Croydon thanking an unknown Club member for the assistance rendered their daughter after she had been thrown from a horse.

The President again reminded members of the resignation of the Secretary, Mr. D. Lee, in December, 1970 and requested nominations.

Mr. Weston spoke of the proposed formation of a Conservation and Restoration Society for the Heidelberg-Doncaster area and members are invited to attend a meeting on 28 August. Mr. R. Johnson will speak on "Birds of the Area." The venue is not known but can be obtained from Mr. Johnson.

The speaker for the evening was Dr. R. T. Forster who gave an interesting talk on "The Continental Drift". His talk explained the controversial Gondwanaland Theory and was well illustrated with diagrammatic sections and maps. Members showed their interest in the subject by asking Dr. Forster many questions and joining in discussion of the points raised.

Botany Group Meeting

13 August, 1970

The subject was a study of Boag's Rocks area by Miss Mary Morgan, Mr. Tom Sault and Mr. Bruce Fuhrer.

Mr. Sault was the first speaker. He discussed the geology of the rock platform. There is a calcareous formation extending from Cape Schanck to beyond the Bellarine Peninsula. Here Boag's Rocks are found. The age of the formation is not known, but is within the last 1,000,000 years. The speaker explained the action of the waves and tides on the cliffs and rocks. It is more difficult for algae to become established on flat rocks than in cavities and fissures. In these the greatest numbers are found growing. Three ways were described, and illustrated with good slides, in which the cavities and fissures arise. There is a rising profile of the coastline at Boag's Rocks and Mr. Sault made the suggestion that the area of this profile is possibly the edge of the tidal wave area of the ancient mouth of the River Yarra.

After this, Miss Mary Morgan spoke of the Ecology of the Shore and Dune Area, dividing this into sand (both on the beach and on some of even the highest dunes), dune shrub area, secondary shrub area after clearing, grassed area and raised rock platform. She supplied comprehensive lists of the plants for each area. As well as lists of vegetation, there were tables of the temperatures, both average and maximum and minimum for each month and the average for the year and the average rainfall (since 1880). Another table was of wind analysis, direction and speed in knots. Here the average taken over the years 1962-1965 was used. Each member was supplied with a typed copy of these lists, with a diagram of the area and the tables.

The third member of the team, Mr. Bruce Fuhrer, spoke mainly of the specimens of algae (seaweeds), which had been washed up on the beach. Owing to adverse weather conditions, he had been unable to collect in the rock pools, etc. He had a good supply of specimens, supplemented by Mr. Sault's beautiful pressed specimens.

The Chairman thanked the team (which had been assisted on some occasions by Mrs. Matches and Miss Lester) for their excellent work and lecture, which had been of great interest to the more indigent (on this subject at any rate) members of the group.

Next Botany Group Meeting, 10 Sept. Mr. Fell, West. Aust.

Western Victoria F.N.C. Association Reports for 1969

MARYBOROUGH

President: Rev. E. H. Deutscher. Secretary: Mrs. Eileen Courtney.

Membership: Adult 54, Junior 7. *Meets First Monday, High School.*

The club has had a stimulating and useful year and the main activities have been varied. Publicity was given prior to the 1969 Duck opening season, followed by newspaper articles and photographs showing the slaughter of protected birds on Opening Day. Opposition, which has been partially successful, has been voiced to local forest grazing leases.

Preservation of Maryborough's Green Belt:

The town's organizations were circularised on this matter and a good deal of support promised, subsequently a panel of members put the Club's viewpoint to the local Rotary Club.

Conservation petitions, particularly the Little Desert, were solidly supported. A successful natural history exhibition was conducted during the Wattle Festival. Members of the B.O.C. were shown many areas of interest during a weekend visit, and the Junior Group, Landscape Section of the National Trust were conducted during the spring around the best wildflower areas. The projcet of preparing and planting the Wildflower Garden of S.S. 2828 was continued during the winter.

MID MURRAY F.N. TRUST

President: Mr. Bert Curtis Secretary: Miss G. Willoughby
Membership Adult 25, junior 11.

Monthly meetings have been very interesting with nature films and observations. Visiting speakers and Trust members have presented the following subjects—

Mrs. I. Kenneady, 'Australian opals', Mr. I. Caldwell 'Life of the Orchard Spider', Mr. Cleary 'Kruger National Park', Mr. Keith Hately 'Kiata National Park', Mr. B. Wait 'Insects', Mr. A. Poppins 'Peru' and Mr. H. Thomas 'Local Aboriginal Tribes'. Excursions took us into mallee country, including a campout at Hattah; others to river country; and to Gypsum flats and Lake Boga granite quarry, where some large specimens of smoky quartz crystals were found. An intensive mallee fowl mound count was conducted over 3,000 acres of mostly virgin country in the Parish of Wandown. 100 mounds were found, and of these about 20 were being worked. Each was numbered and records are being kept and it is hoped this area, which abounds in mallee bird and plant life will become a Sanctuary. The Mid Murray Field Naturalists Trust Report, 1969, has included the recorded list of 210 different birds seen in the Swan Hill Shire and the first of our herbaria counts.

Fortnightly nature notes, supplied by club members, are printed in the local paper and these are well received throughout the district.

PORTLAND

President: Miss Ina Watson Secretary: Mr Colin Skaer
Membership Adult 51, Junior 6 *Meets Second Friday, Town Hall.*

Club meetings have been well attended and the syllabus has included many interesting items. Mr. Kurtze again made his Museum available for his talk on 'Collecting Minerals'. Dr. W. M. Moore of Mt. Gambier introduced us to the world of 'Beetles'; Mr. Jack Wheeler spoke of New Guinea, Western Australia and Lawrence Rock. Mrs. J. Watson, Marine Biologist, gave an interesting account of a biological expedition to Pearson Island, off the S.A. coast. Mr. Len Robinson spoke on 'Birds' and Miss G. Bowker 'Life History of the Mutton Bird'. A film by the late Mr. Crosbie Morrison, taken in Central Australia, with his personal commentary was brought to us by Mrs. Crosbie Morrison. Mrs. Mellblom gave an illustrated talk on her trip to Northern and Western Australia; Mr. B. Bell, Horsham, Victorian Representative Y.F.C., spoke on a trip to Europe, and Mr. Cliff Beaglehole gave an insight into his field work 'Tabulating Flora on the Grid System'. February's meeting was held at Bridgewater Bay, with a beach and cliff search with subsequent identification of the specimens found, and Miss Watson gave an illustrated talk on the life history and banding of seagulls. Outings were conducted to various reserves and sanctuaries and the Mt. Richmond National Park Tower was officially opened by Dr. L. H. Smith and named the Noel Learmonth Tower. Geelong F.N.C. members were in Portland for a weekend and were taken to a number of interesting areas. Much work has been done in conjunction with the W.V.C.C. to preserve the Lower Glenelg and Little Desert as National Parks.

STAWELL

President: Mr. I. R. McCann Secretary: Mr. N. S. Bennett
Membership Adult 29, Junior 5. *Meetings Fourth Monday (Feb-Nov.) Tech. School.*

The Club continues to be most active in all conservation matters and the J. J. Kingston Memorial Wildflower Sanctuary was completed during the year. The opening ceremony was performed by Dr. A. N. Christensen, Vice President, Native Plants Preservation Society at a large gathering of WVFNCA members, who were at Stawell for the Annual Meeting.

Two outings have been held each month, one full day and one half day, and the Club has been represented at the three WVFNCA meetings. Places visited included Pomonal tunnel, Mt. Dryden, Panrock Ck., Barkley Gap and Redbank caves, Mafeking, and Kiata.

SUNRAYSIA R.N. TRUST

President: Mr. John Feild Secretary: Mr. H. Thomas.
Membership 107 adults, 7 Junior.

1969 marked the 20th anniversary of our organization and the highlight of the year was undoubtedly our November meeting, which coincided almost exactly with the inaugural meeting of the Club on 18 November, 1949. Seven of those present at the inaugural meeting attended the 1969 meeting:

These included our first President, Mr. C. Lang, our first Vice President, Mr. L. Chandler and our first Secretary/Treasurer Mr. A. West. Over 50 members were present and it was altogether a memorable gathering.

Our chief preoccupation duing the year has been with the compiling of the proposed constitution designed for the expansion of the WVFNCA into a Victorian Naturalists' Union. The ultimate fate of this document is to be decided at Portland in April next, and we await the outcome with much interest.

Like a number of other Clubs, our membership figures are causing some concern. At the close of 1969 we had a total of 107 financial members, and, although some outstanding subscriptions have since been paid, our membership is still less than it was the previous year. This decline is a serious matter, not only where our own Club is concerned, but with Clubs overall, and it is something that must be looked at very closely if the present drift continues. The reasons for the drift seem to be complex and it may be that eventually the WVFNCA (or the VNU, if it materializes), rather than the individual Clubs, will have to tackle the problem.

WARRNAMBOOL

President: Mrs. K. Shrader Secretary: Mrs. S. W. Alford

Membership Adult 43, Junior 9 *Meets Fourth Wednesday, C.W.A. Rooms.*

The Club has been active in the fight for conservation in various areas throughout the year, and in our own particular area, it appears we have been successful in our efforts to have 2,000 acres in the Sherbrooke River pine plantation proclaimed a Reserve.

WIMMERA

President: Miss D. Armstrong Secretary: Miss A. Jordan

Membership 12. *Meets Third Thursday (Feb-Nov) at Kiata Hall.*

Our Club, although membership is small, is very keen, and the monthly meetings are well attended. This year, circumstances have limited our excursions, but in September, the WVFNCA meeting was held at Kiata National Park and our club members were pleased to be the hosts for this meeting. Members who acted as guides under the leadership of Ranger Mr. Keith Hateley were able to show the visitors not only the interesting features of the National Park itself, but also other areas of the Little Desert. Guest speaker was Mr. W. Middleton, Director of the Wail Nursery, whose intimate knowledge of the Little Desert made his talk of great interest. A splendid film—'The Life Cycle of the Wanderer Butterfly' was presented by Mr. Chapman of Geelong.

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Established 1880

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Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

Geology: Mr. T. SAULT.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates of Subscriptions for 1970

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12 October — At National Herbarium, The Domain, South Yarra; preceded by an Extra-ordinary Meeting at 7.55 p.m. to consider the admittance of Wychitella Forest Protection League as an Affiliate.

1. Minutes, Reports, Announcements.
2. Nature Notes and Exhibits.
3. Subject for evening — "The Naturalist's Role in a Modern World": Dr. M. Calder.
4. New Members. (See next month).
5. General Business. 6. Correspondence.

Monday, 9 November—1970 Natural History Medallion presentation to Miss Jean Galbraith.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 8 October—Botany Group. Mr. J. H. Willis will speak on "Glimpses of New Guinea Plants".

Wednesday, 21 October—Microscopical Group.

Friday, 30 October—Junior meeting at Hawthorn Town Hall at 8 p.m.

Monday, 2 November—Entomology and Marine Biology Group meeting in room next to National Museum Theatrette at 8 p.m.

Wednesday, 4 November—Geology Group.

Thursday, 5 November—Mammal Survey Group Meeting, at Arthur Rylah Research Centre at 8 p.m.

Friday, 6 November—Preston Junior F.N.C. meets in Rechabite Hall, 281 High Street, Preston.

Thursday, 12 November—Botany Group. Miss H. Aston will speak on "Botanical Terms".

Friday, 13 November—Montmorency and District Junior F.N.C. meeting in Scout Hall at Petrie Park at 8 p.m.

F.N.C.V. EXCURSIONS

Saturday and Sunday, 17-18 October—Weekend excursion to Castlemaine with the Bendigo F.N.C. The coach will leave Flinders Street from outside the Gas and Fuel Corporation at **8 A.M.** Bring a picnic lunch and two meals for Sunday. Any money still owing on this excursion should be paid to the excursion secretary as soon as possible.

Sunday, 18 October—Maranoa Gardens. Leader: Mr. A. J. Swaby. Meet at main gate at 2.30 p.m.

6, 7, 8 November—Botany Group weekend at Wilsons Promontory. The coach will leave Melbourne at 6 p.m. on Friday evening from outside Gas and Fuel Building, and return Sunday. Members will need sheets, towels, etc., and food. There is a store at Tidal River. Bookings should be confirmed by the October group meeting. There may be a few spare seats in the bus available to members not in the group but they would need to arrange their own accommodation.

Saturday, 26 December—Sunday, 3 January—Cann River. A coach has been chartered and hotel accommodation booked for this period. The coach will remain with the party for use on day trips, the fare will be approximately $24.00 including day excursions and members will pay individually for accommodation which was quoted at $5.50 for dinner, bed and breakfast, lunch can be obtained for 60 cents.

Tuesday, 3 November—President's Picnic to the Eildon District. The coach will leave Batman Avenue at **8.45 A.M.** Fare $2.00. Bring two meals.

The Victorian Naturalist

Editor: G. M. Ward

Assistant Editor: E. King

F.N.C.V.

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Front Cover:

The New Holland Mouse (**Pseudomys novaehollandiae**) photographed in its habitat by Hans Beste. (See leading article).

Mammal Survey Group Contributions - V.

First Record of the New Holland Mouse (*Pseudomys novaehollandiae* (Waterhouse,1843)) in Victoria

J. H. Seebeck*† and H. J. Beste*

It has been decided to use a series title for all contributions to this Journal from the Mammal Survey Group. The article entitled "Mammals of the Riddell District" which appeared in the July 1970 issue carried the series title "Native Mammals in Victoria" and was Number IV in that series. Previous contributions, un-numbered, were:

"The Mammal Fauna of Darlimurla."	Vol. 85, No. 7, July 1968.
"Whale Strandings at Port Fairy, Victoria."	Vol. 85, No. 11, Nov. 1968.
"A Mammal Survey of Stockman's Reward."	Vol. 86, No. 2, Feb. 1969.

It has been decided to alter the series title to "Mammal Survey Group Contributions", and the article in this month's journal, "First Record of the New Holland mouse (*Pseudomys novaehollandiae* (Waterhouse, 1843)) in Victoria", by J. H. Seebeck and H. J. Beste appears under the series title "Mammal Survey Group Contributions — V".

Introduction

The New Holland mouse has been recorded as a living animal only from New South Wales. The species was known from only five modern specimens until recently, when specimens were collected at Ku-ring-gai Chase National Park, near Sydney, in December 1967 (Mahoney and Marlow 1968) and at Port Stephens, north of Newcastle, in February 1968 (Keith and Calaby 1968). Sub-fossil remains are reported from the Buchan district, eastern Victoria (Wakefield 1960, 1967). Further sub-fossil remains, possibly of this species, in Victoria and Tasmania are reported by Mahoney and Marlow (l.c.). *Pseudomys novaehollandiae* (Waterhouse) has now been collected at the Mornington Peninsula in Victoria, and this constitutes the first record of the species as a living animal in that State (See Figure 1).

Discovery

In late May, 1970, members of the Mammal Survey Group of the Field Naturalists Club of Victoria carried out a brief survey of freehold bushland about three miles east of the township of Tyabb, 35 miles south-east of Melbourne (Lat. 38° 16′ S., Long. 145° 13′ E.). In one area, south of Yaringa Road, one trapline yielded an adult female *Pseudomys novaehollandiae*, together with several *Antechinus stuartii* Macleay and feral house mice, *Mus musculus* L. In the following week one of us (J.H.S.) re-visited the area and in two nights trapping (166 trap-nights) collected an additional twelve specimens (6 ♀♀, 5 ♂♂, 1 unsexed) of *P. novaehollandiae*. Four of these animals (2 ♀♀, 2 ♂♂) were retained. The remainder were ear-tagged with numbered fish fingerling tags and released at the sites of capture. Three of the specimens retained are lodged with the Fisheries and Wildlife Department, Victoria and have the registration numbers 5098, 5126 and 5127.

*Mammal Survey Group, F.N.C.V., C/- Secretary, 40 Howard St., Reservoir, 3073.

†Fisheries and Wildlife Department, Arthur Rylah Institute for Environmental Research, 123 Brown Street, Heidelberg, 3084.

Figure 1. *Pseudomys novaehollandiae* from Tyabb.

photo: J. Seebeck.

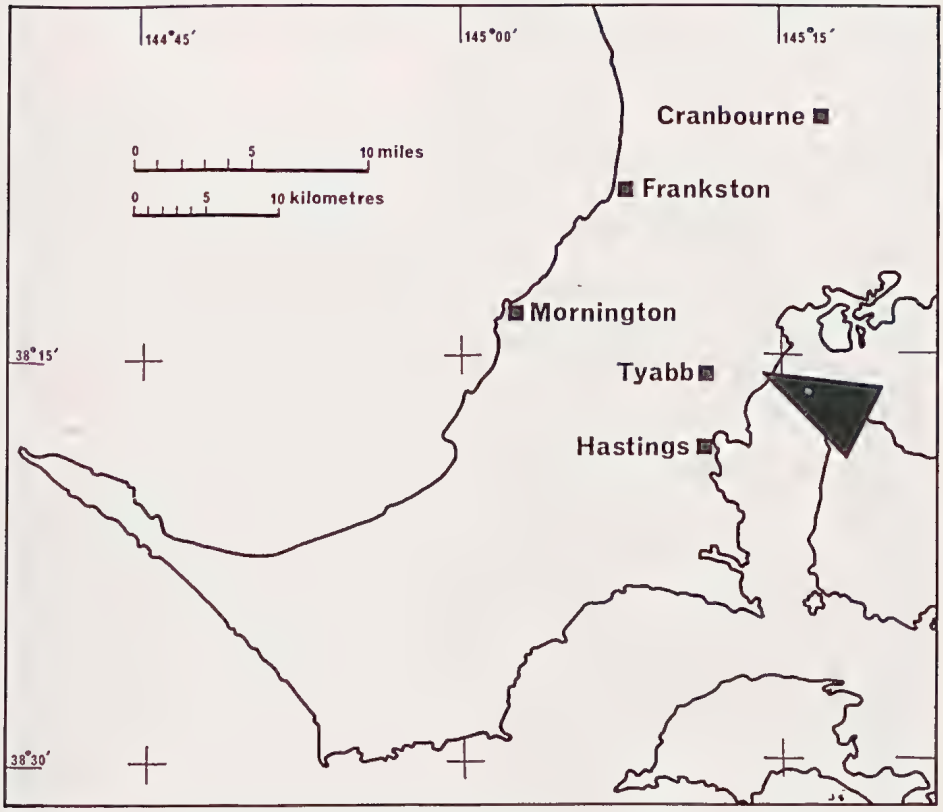

Figure 2. Part of Mornington Peninsula, showing the locality at which *Pseudomys novaehollandiae* has been discovered.

The other two specimens are lodged with the National Museum of Victoria, with the registration numbers C9578 and C9579.

A further specimen, an adult ♀, was subsequently collected at the same locality by H. J. Beste and J. Raithby. This was photographed and then released at the point of capture.

Description of Area

The map (Figure 2) shows the area in which the specimens of *Pseudomys novaehollandiae* were collected.

A. *Topography and soil*

This part of the Mornington Peninsula is very low lying, being mostly about 25 feet above sea level and within a few hundred yards of the sea. The coastal forest strip which now remains is bounded to seaward by a salt marsh and mangroves (*Avicennia marina*) and inland by cleared paddocks. Numerous permanent waterholes and swamps are present.

The soils are deep grey Quaternary sands overlying the Tertiary volcanics of the Western Port Sunklands (Anon. 1964, Hills 1951).

B. *Climate*

Climatic data is not available for this locality. Rainfall figures are, however, available for Hastings, 5 miles to the south, and these are probably similar to those of the locality where the specimens were captured. This data shows that average rainfall is about 33 inches per annum, with highest falls in winter and early spring. (see Table 1).

The area has warm summers and cool winters. Temperature data for Mornington, 11 miles west, is given in Table 1. Temperatures in the more sheltered Tyabb area may be slightly higher than at Mornington.

C. *Vegetation*

The vegetation was an open dry sclerophyll forest with a dense understorey of sclerophyllous shrubs. Figures 3 and 4 show part of this habitat. The tree layer was composed mainly of narrow-leaved peppermint, *Eucalyptus radiata,* with some scattered manna gum, *E. viminalis,* reaching a height of 20-30 feet with a very open canopy. The extremely dense understorey of tall shrubs (5-7 feet) was dominated by *Leptospermum juniperinum,* with *L. myrsinoides, Banksia marginata* and *Leucopogon australis* scattered throughout. Isolated bushes of *Leptospermum laevigatum* and *Casuarina stricta* were occasional components of the shrub layer. Lower shrubs such as *Haloragis tetragyna, Dianella pogon virgatus* and *Dillwynia glaberrima* were often present and the sedge *Gahnia radula* was common in lower levels of the undergrowth,

Table 1.

RAINFALL Hastings, 88 year average to 1963, in inches.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1.17	1.80	2.47	2.79	3.23	3.51	3.22	3.23	3.20	3.16	2.51	2.17	33.06

TEMPERATURE — Mean maxima and minima (°F) for Mornington (35 year mean).

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.	76.6	76.4	73.5	66.3	60.8	56.0	54.6	56.5	60.0	64.3	68.4	73.2
Min.	55.6	56.3	54.8	51.0	48.2	44.9	43.2	44.1	46.3	49.0	51.2	53.7

Figures 3 and 4. Part of the habitat of *Pseudomys novaehollandiae* near Tyabb.

photos: J. Seebeck.

although it occasionally reached 6 feet in height. The small grasstree, *Xanthorrhoea minor* was also found at lower levels as were *Aotus villosa* and *Epacris impressa*. The lowermost twelve inches of the undergrowth was dense, with the rope-rush *Hypolaena fastigiata*, and herbaceous plants such as *Monotoca scoparium*, *Leucorevoluta* and *Amperea xiphoclada* being conspicuous components.

The ground itself was mostly thickly covered with leaf litter, fallen twigs, mosses, lichens and large numbers of sundews (*Drosera* spp.) and members of the family Orchidaceae. Many species of fungi were also present.

The vegetation throughout this area was remarkably uniform, except where it had been disturbed by man, and all capture sites of *P. novaehollandiae* were essentially similar in floral composition. A slight change in the botanical composition occurred near the edge of the salt marsh, with more *E. viminalis* and *Banksia* present, and with bracken (*Pteridium esculentum*) becoming an important component of the undergrowth, although this was still dominated by *Leptospermum juniperinum*. No *Pseudomys* were caught in this area but this may have been due to the limited amount of trapping.

Mammal Distribution in the Area

Trapping was carried out using initially, wire mesh cage traps and later, aluminium box traps, baited with a mixture of rolled oats, peanut butter and honey. Most traps were set in a series of more or less parallel lines, in a roughly rectangular area of about 6 acres. *Pseudomys novaehollandiae* was captured in all trap lines.

From a total of 190 trap-nights, 53 mammals were trapped, a capture rate of 26.8%.

Three species (one marsupial and two rodents) were trapped in approximately equal numbers. These were *Antechinus stuartii* (18), *Pseudomys novaehollandiae* (14) and the introduced house mouse, *Mus musculus* (17). It is probable that the house mouse is slightly more abundant in this area than indicated by the trapping results, as several traps had the bait removed by this species without being set off. A single eastern swamp rat, *Rattus lutreolus* (Gray) and two short-nosed bandicoots, *Isoodon obesulus* (Shaw and Nodder) were also captured. It is difficult to assess bandicoot numbers in the area over a short term period, but almost every square yard of ground in the forest showed evidence of their feeding. The only other native ground mammals present were the echidna, *Tachyglossus aculeatus* (Shaw) whose diggings were frequently encountered, and the black wallaby, *Wallabia bicolor* (Desmarest). This latter species was not sighted within the trapping area but several wallaby skeletons were found and the large runways formed by this species in the undergrowth criss-crossed the whole of the trapping area.

Biological Notes

The specimens collected at Tyabb agree very closely in pelage coloration to the description given by Keith and Calaby (1968), but comparison with skins of *P. novaehollandiae* from New South Wales show that the Victorian specimens are darker and greyer in colour. Flesh and skull measurements of one female (Fisheries and Wildlife No. 5127) are given in Table 2, and these fall within the upper limits of the ranges quoted by Keith and Calaby with the exception that ear length is slightly greater. For comparison, the appropriate measurements of those authors are included in Table 2.

TABLE 2.

Comparative Measurements of *Pseudomys novaehollandiae*.

	Tyabb (FWD 5127♀)	Port Stephens — observed range*			
		Females		Females with worn molars	
(a) Flesh measurements		(N)		(N)	
Weight (gm)	16	32	13 - 20	9	14 - 20
Head and Body (mm)	82	35	74 - 95	10	82 - 95
Tail* (mm)	33*	32	85 - 107	9	94 - 107
Pes (mm)	21	35	20.5 - 22	10	20.5 - 21.5
Ear (mm)	18	35	15.5 - 17.5	10	15.5 - 17
*most of tail missing					
(b) Skull measurements (mm)					
Total length	25.4	33	23.2 - 25.8	9	24.0 - 25.7
Condylobasal length	20.8	35	20.6 - 23.4	10	21.9 - 23.2
Basal length	21.6	33	19.0 - 21.5	10	20.0 - 21.3
Zygomatic width	12.8	35	11.6 - 12.5	10	11.8 - 12.5
Interorbital width	3.8	35	3.5 - 4.1	10	3.5 - 3.9
Interorbital length	3.7	33	2.8 - 4.0	10	3.1 - 4.0
Interparietal width	8.8	35	6.6 - 8.4	10	7.0 - 8.3
Braincase width	11.6	35	11.0 - 12.0	10	11.0 - 12.0
Mastoid width	11.6	35	9.3 - 10.4	10	9.6 - 10.4
Nasals length	9.3	33	8.0 - 9.8	9	8.2 - 9.8
Palatal length	13.2	35	11.7 - 12.9	10	12.0 - 12.9
Left palatal foremen length	5.6	35	4.1 - 5.5	10	4.8 - 5.5
Inside m^{1-1} width	2.6	35	2.3 - 2.9	10	2.6 - 2.9
Outside m^{1-1} width	5.4	35	4.8 - 5.4	10	4.9 - 5.4
Bulla length	4.4	35	4.2 - 4.9	10	4.3 - 4.9
Crowns m^{1-3} length	4.0	35	3.4 - 3.8	10	3.5 - 3.8
Alveoli m^{1-3} length	4.2	35	4.6 - 4.0	10	3.7 - 3.9
Crowns m^{1-2} length	2.8	35	2.4 - 2.9	10	2.6 - 2.9

*data from Keith and Calaby (1968).

Figure 5 shows side, ventral and dorsal views of a skull from the Tyabb colony (left) and a skull from Port Stephens (right). The Tyabb specimen shows a greater degree of tooth wear but tooth morphology is the same as in the Port Stephens specimen.

All specimens examined appeared to be adult. The females had imperforate vaginae and the nipples were not in use. Testes in all the males were abdominal. These observations support Keith and Calaby's suggestion of a breeding season for this species.

A small series of ectoparasites, mostly fleas and ticks, were collected from the animals. These have not yet been identified. It is of interest to note that very few ectoparasites were present on *Mus musculus* from the same locality.

Discussion

The north-western shore of Western Port Bay has apparently suffered little major change for many years Fires have been mainly absent for a period in excess of thirty years and the only significant change has been in the amount of bush country cleared. These factors must have been of major significance in the survival of this colony of *Pseudomys novaehollandiae*.

The discovery of the New Holland mouse on the Mornington Peninsula highlights the need for detailed biological surveys in Victoria. The Peninsula, being so close to the metropolitan area of that State, has long been settled and the remaining bushland is now greatly dissected by rural, urban and industrial development. Major industrial expansion is now taking place along the shores of Western Port and it is perhaps unfortunate that the New Holland mouse should have only been discovered at this time, when the remaining habitat is already being altered by the encroachment of industry.

Factors such as this make conservation of this species a difficult problem to solve.

Acknowledgements

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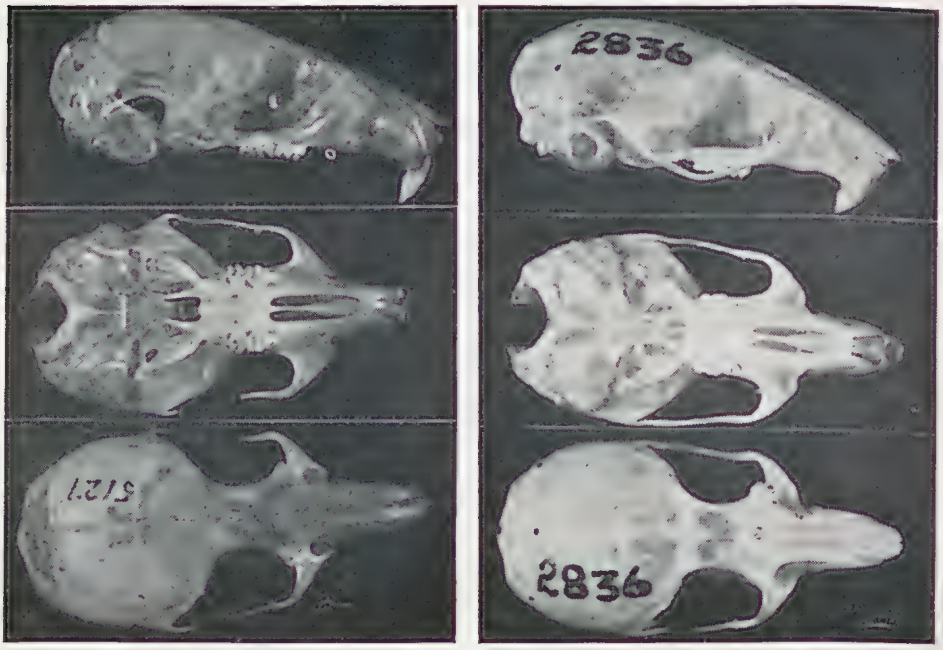

Figure 5. Skulls of *Pseudomys novaehollandiae*.
Left — Tyabb specimen. Right — Port Stephens specimen.
photos: J. Cooper, Fisheries and Wildlife Department.

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A Biological Survey for Victoria

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(From an address delivered to the F.N.C.V. on 13 July, 1970.)

Questions relating to conservation and national parks in Victoria in recent years have thrown great emphasis on the lack of real basic knowledge — and I stress the words "real basic" — that exists concerning the flora and fauna of this State. I do not wish to be misunderstood at this point, or to have my listeners think that I am critical of the activities of professional and amateur bodies interested today in the various phases of natural history or in conservation. Far from it — I have always had the greatest admiration for that large body of people, some individuals, some in societies, mostly amateurs who, over the past approximately 150 years have worked with a common end point — the accumulation of knowledge. I am ever reminded of this as, over the years, I have studied the dossiers of your Natural History Medallion awards.

A very early, and very well informed and respected member of your club — the late Sir Russell Grimwade — made a very profound statement in 1954, which to my way of thinking, has a definite bearing on the very subject we are discussing. Sir Russell, in his foreword to the Centenary History of the National Museum of Victoria, made the following statement —

"There are both duties and obligations upon those of a civilised people who, for their own or their country's advantage, enter a strange or almost empty land. The first duties consist of establishing what is known in modern military parlance as a bridgehead, a landing where their occupation is secure and where sorties can be made inland to survey and explore new territory.

The making of the bridgehead of British people on the coast of Australia towards the end of the 18th. century is now a well known matter of history. The difficulties of the first settlement

in an empty and comparatively harsh land were tremendous and of such magnitude that it was doubtful at times whether the planned occupation could be carried on. Carefree Australians today are apt to forget that at the time of first entry their land produced no orthodox food and its soils had never been cultivated, and that the abundance of foods produced within its boundaries today all have their origin overseas.

The germ of all edible plants and animals was imported from foreign lands, mostly those of the northern hemisphere. The provision of food, storage of water, and the development of means of communication constituted the first duties of the pioneers. When these very first needs were fulfilled, even in rudimentary manner, the obligation to posterity became revealed.

The thoughtful man in a new country like this then becomes aware of his obligations to his successors and realises that his coming to a new land may cause permanent changes in his environment. In no other country has the natural equilibrium achieved by countless centuries of isolation been so violently upset as in Australia. Within half a century of entry, this land was carrying millions of hoofed animals where not a single specimen had existed before. New trees, new crops and new insects were rapidly introduced —all prospered with a fecundity that has brought the country fame and fortune in a very short time. No country has been so violently disturbed in its age-old rest, and consequently in no country has the balanced environment of nature been so violently subjected to change. In no country, therefore, does the responsibility of preserving a knowledge of the past rest quite so heavily on its people."

These were truly prophetic words written by Sir Russell, which appear to have been forgotten since they were penned in 1954 — at least I have never seen them quoted among the mass of material that has been printed or spoken during the conservation discussions of the past few years.

A second equally profound, but much older statement, carrying just as much wisdom, came from the writing of John Gould, that father of Zoology and Zoological illustration in this country. This statement of his appears to have been equally forgotten.

Over 100 years ago, when Gould was writing his Introduction to the Mammals of Australia, he was mostly concerned with telling his readers about the discovery of the different kinds of mammals which occurred in the then newly occupied island continent (and incidentally in the discovery of which he had played such a conspicuous part). But even in these early days he found it necessary to speak of the problem which would be faced by the Australian naturalist in days ahead, and so he wrote —

". . . Australia — a part of the world's surface still in maiden-dress, but the charms of which will ere long be ruffled and their true character no longer seen! These charms will not long survive the intrusion of the stockholder, the farmer, and the miner, each vying with the other to obliterate that which is so pleasing to every naturalist; and fortunate do I consider the circumstances which induced me to visit the country while so much of it remained in its primitive state."

What does all this mean? It means surely that in this country, now only just two hundred years of age as far as modern history is concerned, there existed a unique fauna and flora which we, as a civilised race, have changed considerably, or perhaps more accurately, have accelerated the change that was taking place. What is more important, I feel, is how much have we changed it, and in what direction are we changing it?

Some people find it very easy to answer these questions, relying to a certain extent on hearsay, or on their own observations over a period of years, sometimes short and sometimes long or even both. This of course is not the true overall picture, and it is absolutely certain that

no person living knows the exact picture. This should not unduly dismay or deter us, although I realise that it will probably upset some people who, with best of intentions, use their own limited observation as a basis for overall deductions. This can be dangerous of course, but in its favour is the fact that these people are thinking and comparing their own experience in two points of time — the present and as far back as they can genuinely remember. This is not the true picture that all of us are requiring. What we want to know, and I am afraid they will never be known, are two fundamental matters — firstly, to what exent has the fauna and flora of Australia changed since 1788, and secondly, at what rate is our position deteriorating or improving at the present time? It is true that quite intelligent guesses can be made at both of these questions, but are intelligent guesses enough? I maintain, that while they may indicate trends in certain directions, they do not produce answers in this scientific age that requires overall answers that cannot be questioned in any manner.

I would commend to you at this stage the very recently published book by Oxford University Press entitled "A Guide to the Mammals of Australia" by Dr. W. D. L. Ride, the Director of the Western Australian Museum. This very thoughtful work discusses not only the overall position of our fauna, but also the accurate history, as far as is known, of every individual species.

How can we establish the bank of information that we consider necessary for such purposes? I am afraid that, while the past 182 years have been ticking over, we have been losing valuable opportunities to provide the basis for making present-day comparisons. Let me point out strongly at this juncture that I am not attempting to hold a post mortem on the present situation, with the intention of laying blame on someone or some particular policy. This to my way of thinking is childish in the extreme, and nothing is more likely to discourage serious consideration of a problem than this attitude, if it is slavishly left at that. True it is invaluable in providing some information, but such information must be used in a constructive form to provide a basis for future work.

If we look back a little into the past, and let us go right to the start of settlement in Victoria, we find that a commendable start was made in studying the natural history of this colony very early in its infancy, e.g., an Institute for the Advancement of Science held its first meeting in June 1854; the Philosophical Society of Victoria held its first meeting in August 1854; the Philosophical Institute of Victoria held its first meeting in July 1855; with the Royal Society of Victoria being given permission to use this title "Royal" in November 1859.

All of these scientific bodies were eminently constituted for first class scientific natural history work—such well known names as Baron von Mueller, Captain Andrew Clarke, Dr. Godfrey Howitt, Alfred Selwyn, Brough Smyth, and Professor Sir Frederick McCoy to mention just a few being prominent in the early work carried out by these institutions. Likewise, the Philosophical Society of Victoria was instrumental in establishing a Museum of Natural History, the forerunner of the now eminent National Museum of Victoria.

These bodies without exception, undertook field work in Victoria from their inception, and as settlement moved out from Port Phillip

so did the range of investigation move out. In many cases the exact opposite resulted — the expeditions of competent naturalists into, until then, unknown parts of Victoria providing the opportunity for settlement to be effective later. A great deal of information was published by the responsible Society at that time and this, combined with field notebooks that still exist in some cases, provide what we know today of the natural history of that period.

As an example of what was happening even at that time, it is worth considering for a short time the results of Blandowski's expedition to the River Murray in 1856 to 1857. William Blandowski, as some of you may know, was a Polish emigrant to this country who in April 1854 was appointed the first Government Zoologist to the Natural History Museum. He was also a member of several of the previously mentioned societies. In 1856, he was commissioned by the Government of the time to proceed northwards to the Murray River and collect specimens for the museum. Leaving Melbourne early in December 1856, he and his party travelled north to the river, collecting as they went. Because of several difficulties, which need not be discussed here, the actual number of species of mammals and birds collected was not large, although some 16,000 specimens of all kinds were deposited in the museum. What is most important, however, and very pertinent to this talk, is the fact that on this expedition alone he collected at least 7 native mammals, *none of which have ever been seen since*. These ranged from native cats, to Phascogales, to Bandicoots to marsupial Mice.

Now what is the significance of this? Surely, that even at that short time after man's entry to this country our fauna was disappearing. I think it is well to remember this, as there are thoughts among some interested persons that this process is a very recent one — it is not, it has been going on for centuries, and while we may not be able to stop it completely, we should endeavour to slow the process to the lowest possible figure.

The inauguration of your own Field Naturalists Club in 1880 brought a fresh interest to natural history, with not only many of the scientific members of the earlier societies joining the club, but with a large number of devoted amateurs, who gave of their time and talents in unravelling some of the mysteries of nature in the new State of Victoria. The results of this work were published in the Victorian Naturalist, and many of the collections made were deposited in such institutions as the National Museum and the National Herbarium — these still form the backbone of a large part of our knowledge of that period. What a wonderful record of information is stored up in the pages of the Naturalist over the years.

At the same time or just before the earlier group of natural history societies were forming themselves in Melbourne, the government of the day established the Geological Survey of Victoria, with Alfred R. C. Selwyn being appointed in 1852 Director of this Survey. My reason for mentioning this very important fact in time is that while such a Geological Survey was established then and has functioned in a particularly valuable manner since that time, with only two separate and distinct breaks, to the present day, no serious attempt appears to have been made to establish a sister organisation, just as important as its opposite number, a Biological Survey of Victoria. The Geological

Survey of Victoria over its long period of service in this State, as well as proving most useful to miners and prospectors at the time of its inception, is now able, with its wealth of accumulated knowledge, to provide invaluable assistance to Governments and Industry alike, on matters of economy and policy.

Returning to the subject of a Biological Survey, what exactly do we mean when we use that term? Putting it as briefly as possible, it means a comprehensive study of the fauna and flora of a particular country in all its various ramifications, e.g., taxonomy, distribution, population, ecology, effect of introduced animals and plants and any other factors which have a bearing on the subject of fauna and flora. It automatically envisages four separate and distinct functions —

(a) The building up and maintenance of fully documented collections of fauna and flora;

(b) The conducting of research work, both in the laboratory and the field, on the collections so obtained, with additional field work to produce more collections and more research. (Of course this is becoming more difficult and more important in Victoria).

(c) The repeating at regular intervals, and *this is most important,* of detailed surveys on a similar framework of research to determine change trends.

(d) The interpretation of the results obtained from the above functions.

Because of the very nature of the work envisaged, it naturally embodies a large central organisation that can house both scientists, collectors and collections. But more of this later.

It is well to consider at this stage something of what has been done in the past, and the value of this information in formulating policy for a Biological Survey of Victoria. Let me make it perfectly clear at this point that this proposal I am putting forward is not an original idea of my own, or for that matter is it reasonably new. I understand that it has been discussed by this very club many years ago, the late Dr. C. S. Sutton, a botanist, being particularly interested in it. But like other ideas which require large sums of money, detailed organisation and certainly great capital expenditure, it becomes a Government venture which needs a very receptive and interested Government to get it off the ground.

If we go back well into the past and exclude the Geological Survey, we find that before the year 1860, there were two major institutions that were accumulating collections by conducting field survey work either by themselves or by interested naturalists, and conducting research on these collections and publishing the results. These were, of course, the National Museum which commenced operations in 1854; and the National Herbarium officially established in 1857, although there were abundant collections made prior to that date. Both of these institutions now house very valuable and extensive collections, many of which could never be replaced. These collections must form the basis for any future work on a Biological survey of Victoria or for that matter, a Biological Survey of Australia. These collections, of course, have their limitations, particularly as regards accurate localities, e.g. van Diemen's Land, terra Australis.

Referring to a proposed Biological Survey of Australia, this matter has been under consideration on a Com-

monwealth level for at least ten years, and detailed proposals have been submitted to the Commonwealth Government by a special committee of the Australian Academy of Science to set up, in Canberra, a "Museum of Australian Biology" which would have two main functions, (a) to carry out a biological survey of Australia and its territories, and (b) compile a comprehensive volume on the "Flora of Australia." This latter, as you all know, has been urgently required in this country for many years, there having been nothing published on such a comprehensive scale since Bentham and Mueller's Flora Australiensis, published between 1863 and 1878, and although this has been recently reprinted, it contains nothing new as it is a facsimile edition.

It is pertinent to comment here that with both of these projects, the new museum will have to fall back very heavily on information that has been gained by the States over the past now nearly two centuries—some information that is vague and of doubtful use, the remainder being of great importance.

Any attempt to carry out a detailed biological survey of Australia now will of course be important in determining the present state of the huge complex of animals and plants in this country — the great pity being that a similar project had not been initiated a century ago, when useful comparisons could have been made with the present position, information that would have been invaluable in discussion on conservation. As far as the preparation of a Flora of Australia is concerned, such work must of necessity be based almost entirely on information available from State Herbaria or from State Floras that have been published from time to time. In this regard, Victoria is in a very vital position, its Herbarium containing not only the greatest number of specimens of any herbarium in Australia—between one and a half and two million, certainly not all Australian — but also the majority of von Mueller's type specimens — some 2,000 all told; while J. H. Willis' Handbook of the Plants of Victoria is the most comprehensive State Flora that has yet been published, and must be vital to the Biological Survey of the future.

The remaining sources of information are quite varied and numerous, and consist largely of information stored away in a number of Government or University Departments, and in a small number of cases in the records of amateur naturalists. This has been, of course, the natural development over the years in the absence of any unified control of such scientific work. To name some of the projects that have been carried out apart from the National Herbarium and the National Museum we have the mammal and other projects of survey and ecology by the Fisheries and Wild Life Department; the entomological and plant pathological work of the Department of Agriculture; the entomological research of the Universities of Melbourne and Monash; the mammal work at Monash University; the detailed researches of C.S.I.R.O. and the Commonwealth Serum Laboratories on insects, spiders, mites and reptiles; the entomological and plant disease work of the Forests Commission; not forgetting of course the valuable work conducted by such naturalist bodies as the R.A.O.U., the B.O.C., and the F.N. Clubs, and certainly not forgetting the individual amateur work of such present day authorities as Jean Galbraith and Cliff Beauglehole. The amateurs of the future will certainly have a

greater part to play than in the past. Again, I emphasise, there is no criticism on my part of any of this work — all concerned have contributed greatly under far from ideal conditions.

Now where does all of this bring us? If it were possible in Victoria, at some top administrative level, to bring together under one unified control all of the results obtained over the years and to direct future activities so that there was no overlapping, or at the most, a minimum of overlapping, then a nucleus for a Biological Survey for Victoria would have been set up.

There are world recognised techniques on how such a survey could be organised in a State such as Victoria, and it is not my intention to discuss these in great detail; but it is perhaps pertinent at this point in this address to say something of the work that has already been carried out, and is planned for the future by the Plant Survey Council of Victoria, as this, I feel can readily set a pattern for the future. This body was set up in 1966 under the sponsorship of the Botanic Gardens Branch Research Trust, one of the bodies set up by the late Maud Gibson, and the Botany Department of Monash University. Its aim was to provide factual information about the detailed distribution of plants, both past and present, information which is basic to any future scientific botanical study in the State. The extent and the rate of change in the distribution of plant species can only be met by a comprehensive mapping scheme, such a scheme contributing greatly to bridging the gap between increasing agricultural and industrial requirements and inadequate conservation.

The method being adopted, which corresponds closely to that originating in the United Kingdom, is to use modern mechanical data-processing methods in preparing a comprehensive series of maps (1 for each species) based on distribution within a series of squares on a standard map. As an example of what can be done, we have here a copy of a Scandinavian Plant Survey of similar style, in which the distribution of all species present is shown in map form. In Victoria, the presence of each species will be plotted in each 10 minute "square" of latitude and longitude, using the Department of National Mapping grid superimposed on their Geographic Series Maps of 1 : 500,000 scale. The magnitude of such a task will be seen when it is noted that there are more than 1,000 such "squares" in Victoria, each square approximately 11 miles from north to south by 9 miles from east to west. A copy of this reference map will be used as end papers in Vol. II of J. H. Willis' Handbook to the Plants of Victoria which we hope will be published within twelve months.

The ultimate aim of such a project as this is to map the total distribution of every species of plant throughout Victoria. To do this, mapping must be based upon a sufficient number of localities evenly distributed within the area in question, notwithstanding whether the species is rare or common. The biggest limiting factor of course will be the scarcity of trained observers and collectors. It will be essential to the success of such a survey to have not only devoted observers, but observers who have an accurate knowledge of the identification of species or plants and a detailed knowledge of the area in question, who are prepared for many years to devote the whole of their spare time at all periods of the year to a con-

centrated effort within perhaps one of these "squares". While such areas may appear small on a map of Victoria, a detailed study of an area 11 miles by 9 miles over every period of the year, is a major project. At this early stage of the survey, it will be advisable to concentrate only on the presence or absence of any species in an area — at a later stage will come the determination of relative abundance, plant ecology, change in habits, etc. It is much wiser to get the scheme off the ground in a simple but effective form rather than bog it down with masses of details which observers may not be able to fulfil.

How will such a project be organised? It will depend, I feel, on three essentials —

(a) The availability of sufficient trained observers who are prepared to undertake this task. Where will these people come from? Obviously the various Field Naturalists' Clubs throughout the State will play a major part in this task. It is worth recording at this part of the address that one of your active botanists, Cliff Beauglehole, has for the past two years, been undertaking such work for the Plant Survey Council in the Grampians — an area chosen because of its importance botanically in the State, and also because of Cliff Beauglehole's intimate knowledge of the area. The result of this survey has been spectacular — whereas in 1965/66 some 825 species had been recorded from this area, this figure has now been increased to over 1,000 by such collectings. Later, he has obtained similar information in far-east Gippsland. In addition to F.N.C.V. members, it is anticipated that reliable accurate results will also be obtained from Forest Commission Officers, Land Department Inspectors, Agricultural Department officers living in a particular area, High School teachers with a knowledge of biology. There is a wide field of untapped observers who, with a little training, could commence this work.

(b) The provision of accurate information of what species are likely to be present in any given locality. This is fundamental to such a project. Fortunately, a great deal of this work has already been carried out by the National Herbarium and the Botany and Computer Departments of Monash University. All available records have been obtained and examined, both specimens and literature, and relevant information transferred to computer sheets so that in quite a small form, much knowledge of every species of Victorian plant is stored away. I have here the completed picture for all plant species in Victoria giving synonyms, authorities and distribution within the State as per the grid system. While this is a useful document on its own, its main value lies in the ability to obtain from this, computer printing of all the species recorded from any of the major squares. Once this is printed, it will form the basis for work within each of the squares.

(c) Where any uncertainty exists in the mind of the observer

during the survey, he must collect actual specimens of the suspect plant and forward them to the National Herbarium for identification. While this sounds easy in theory, it is not so easy in practice, as it throws an additional burden on the staff of the National Herbarium who are already numerically short-staffed. While this may appear to be only an administrative matter, it is a real problem, as taxonomic botanists are difficult people to obtain these days.

The obvious question is what will be the use of doing this survey. I feel it will enable two things to be done.

Firstly, if carried out over a sufficiently large number of years, it will provide vital information that can be used in conservation studies and determining policy; and secondly, will provide a scientific basis for further studies in distribution, and ecology. The printing of such material for each square, combined with similarly sized transparent sheets showing rainfall, elevations and soil types, opens up endless work for the future.

While this latter part of the address has concentrated largely on botany, because this is the section of natural history that has been studied in detail up to date, exactly the same can be applied to mammals, birds, reptiles, insects, spiders and the host of other forms that make up the entire biological picture.

Perhaps some of you will say that this is only a dream — it could be a nightmare for the person organising it — that could not be effected practically. I personally do not think that this is correct. Provided there are enough persons with vision who can influence authoritative persons, the scheme could get off the ground. It would be a major project — one of the greatest ever undertaken in natural history in this State, but what conclusions could be forthcoming from such a project! For example, in the study of mammals, would we have had to wait so long for the rediscovery of Leadbeater's Possum, or the discovery of a live Burramys near Mt. Hotham, previously known only in fossil remains.

How could such a Biological Survey be conducted? It would first require the establishment of a central biological institute, directed by an experienced versatile scientist who, with sufficient expert and technical staff, would examine, sieve out, and collate, all relevant past information available from literature or from specimens and records still to be found in various Government Departments; and secondly this Institute should have sufficient trained outdoor staff to undertake survey work in natural history generally of the same standard and calibre as has been described in the Plant Survey work being contemplated now. The present is not too late for this — but time is running out.

In conclusion, I would like to refer to the late Sir Herbert Olney, whom some of you may remember, and who had a very happy way of approaching such a position. When anything major was being discussed in committee by any of the major boards of which he was Chairman, and when all the drawbacks and difficulties were being presented, he would quietly take from his pocket some small badges, and give them to the dissentients. On this appeared four words only — *It Can Be Done!*

Victorian Non-Marine Molluscs – No. 2

by

BRIAN J. SMITH*

Victoria has a number of introduced non-marine molluscs belonging to several families. All of these are fairly common, successful animals with a very wide distribution. Many occur in large numbers and can even reach plague or pest proportions — unlike the native species which are usually localized and living in perfect balance with their environment.

Perhaps the best known group of introduced snails belong to the family Helicidae of which there are no native species in Australia. Victoria probably has 7 species of this family and these will be described in this and next month's article.

Helix aspersa Miiller — The Common Garden Snail.

This is the snail with the large brown, globular shell, found in great numbers in most gardens. The patterning on the shell is very variable, ranging from a dark brown shell with wide, black, zigzag bands, giving the shell a very dark colour, to a pale, straw-coloured shell with a few faint, brown lines. Large specimens reach over 30mm. in diameter. They are frequently found crawling on paths after dark or in wet weather. In dry weather they can be found sealed to smooth surfaces in damp, dark places, aestivating. When crawling, they extend a long way out of the shells, the body being a dark, muddy green, to grey. They should be found anywhere in the state where man has extensive settlement, though they will tend to be confined to the damper garden situations.

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Genus Cochlicella

Two more helicid species, commonly found in certain parts, belong to the genus *Cochlicella,* The Pointed Snails. The smallest and most common of these is *Cochlicella ventrosa* (Ferussac). This has a small, conical shell about 8-10 mm. high. The shell is often very thin and fragile, except in calcium-rich areas, and usually has a series of dark brown bands on a light shell. These bands may, in some cases, be so wide as to give the appearance of a uniform dark shell. This species is common in coastal regions and in sandy areas in the Southern part of the state; however it may prove to have an even wider distribution.

The other species of this genus to be recorded from Victoria is *Cochlicella acuta* Miiller. This can be distinguished from *C. ventrosa* by its larger size and different shell pattern. This species has a very elongated shell, averaging between 15-26 mm. It is usually a light fawn colour with small brown flecks and a single dark brown band at the base of each whorl. This seems to be more commonly found in the Northern part of the state in the drier, sandy areas, but, like the other species, may have a wider distribution.

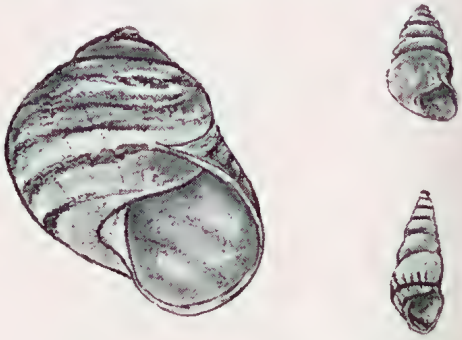

Fig. B — *Cochlicella ventrosa*
Fig. A — *Helix aspersa*
Fig. C — *Cochlicella acuta*
(Drawings by Miss Rhyllis Plant).

Award of the Australian Natural History Medallion

by

A. J. Swaby and J. H. Willis

Since its inception in 1939, the Australian Natural History Medallion has been awarded to only four women — all members of the Field Naturalists Club of Victoria. Latest in this distinguished company, which includes Edith Coleman decd. (1949), Thistle Stead (1963) and Winifred Waddell (1964), is Miss Jean Galbraith of Tyers (via Traralgon), Vic. Her selection by the Award Committee, from among 16 nominees for 1970, was greeted by enthusiastic approbation and genuine delight throughout our Club.

It is almost 47 years since Jean linked up as a country member of the F.N.C.V., on 10 December, 1923, and in April 1959 she was unanimously elected to honorary membership. Her first note to the *Victorian Naturalist*, on "Magpies as Peacemakers", was published in December 1925 (Vol. 42 page 210). Since that date she has embellished the journal with 81 papers and natural history notes of great variety, but chiefly concerning plant and bird life. Outstanding was a series of illustrated and informative articles on "Australian Wattles" (most of them indigenous to Victoria) that appeared as 39 separate contributions between May 1959 and March 1964. There are few indeed who have been so active in the literary and practical life of this Club for five decades. Among her special friends during earlier days were such stalwarts as the late Edith Coleman, T. S. Hart, H. B. Williamson, E. E. Pescott, Mr. and Mrs. C. L. Barrett. At Club

Photo by courtesy of Mrs. S. Dearnley, Collins Publishers.

shows in the 20's and 30's she was a familiar figure at the systematic tables of wildflowers, applying her knowledge cheerfully. With the more recent formation of the Latrobe Valley, Sale and Bairnsdale Naturalists' Clubs, Jean's energies as lecturer and excursion leader have found a convenient outlet nearer home in Gippsland.

In February 1926, the *Garden Lover* initiated a long series of monthly articles on Australian plants, 'Day to day in the Garden' under the authorship of "Correa"; while in 1954 *Your Garden* began a regular feature on 'Trees', followed for a year or two by a garden diary. Correspondence indicated that people throughout Australia read both publications; but it was equally evident that many readers looked forward principally to the contributions of "Correa". Her notes, full of sympathetic understanding and infec-

tious delight in the ways of nature, revealed a gentle country family, their establishment of a wild garden, the co-operation of friends and neighbours, their devout but thoroughly practical Christianity, and her own intense interest in Australian plants. It is not difficult to guess the indentity of "Correa"! Many of these early experiences and observations were gathered together and published in book form as *"A Garden in a Valley"* (Dec. 1939) — it has been out of print for a generation, but one continues to hope for another edition of this altogether enchanting record.

When A. J. Ewart's *Flora of Victoria* (1931) became increasingly rare and expensive, and E. E. Pescott's earlier *Native Flowers of Victoria* (1914) was quite unobtainable, Miss Winifred Waddell conceived the idea of a new wildflower guide for the State: something of reasonably low price which, while by no means comprehensive, would illustrate and describe in simple non-technical language representative species of flowers from every family and district. Who better to undertake such a task than Jean Galbraith? Thus, *Wildflowers of Victoria,* with 175 photographic plates, came off the press in 1950, satisfying a very real need; it is now in the third edition, nomenclature brought up to date. Miss Galbraith has spent the last few years writing a much more comprehensive book on plants found between the Dividing Range and coast of south-eastern Australia (Queensland to South Australia). This is now in press and will be published in 1971 by Collins of London.

The first wildflower sanctuary ever established by the Native Plants Preservation Society of Victoria was at Tyers, donated by Jean Galbraith and dating from 1936. At the formation in 1957 of the now very large Society for Growing Australian Plants, Jean's wide influence in this field was recognized by her election as a foundation life member. Her gift for imparting knowledge in crisp descriptive phrases is apparent through innumerable articles for children in the N.S.W. *School Magazine.* She has also written several charming booklets for 7-9 year olds on such subjects as "Fruits" and "From Flower to Fruit" (the pollination and fertilization processes), published by Longmans, in addition to the popular "Grandma Honeypot" and "The Wonderful Butterfly" published by Angus & Robertson. In recent years her presence as a very acceptable lecturer on the C.A.E. summer schools at Mt. Beauty (near Bogong) has become an annual event.

Jean has travelled widely in all Australian States, observing, appreciating and collecting assiduously. The National Herbarium of Victoria is fortunate in having a large share of her dried botanical specimens from these expeditions, as well as many local lists of plants compiled for various districts she has visited in her home State. Her discoveries include several new species, e.g., a rare parrot-pea (*Dillwynia*) at Mt. Beauty and a willow-herb (*Epilobium*) on the Dargo High Plains, and she has been able to extend the known range of other less common plants. To those of us who have experienced the hospitality of her happy home, the warm friendliness yet innate modesty of her personality, and her big-hearted capacity to see only the better side of everyone else's nature, this present honour seems long overdue. For quality of work and impact on the public, no one could be a more worthy recipient of the Australian Natural History Medallion, 1970.

Mortuary and other Monuments to Aborigines

by

ALDO MASSOLA*

The psychology of armed conquest dictates that the winner takes all. The loser becomes an object of scorn and it appears to be perfectly natural that he should forgo not only his worldly possessions, but also his social standing, and often, especially if of a different race, even his rights as a human being. His womenfolk, too, are at the mercy of the conqueror, and at least a proportion of them willingly and by choice leave their discredited men and elect to become the "mates" of the dispossessors of their own people.

This also happened in Australia. The first colonists formed a poor opinion of the "sneaking, murdering, black cannibals", as they were described by a shepherd (*Letters from Victorian Pioneers*); yet many of the shepherds and not a few of their "gentlemanly" masters kept the "astonishingly beautiful" native women at their stations. Witness the high percentage of half-castes in the present day Aboriginal population; who are certainly not descended from Aboriginal men - European women alliances.

The Aborigines then, having been subjected to the usual loser's treatment, and having been regarded by their conquerors as of no account, it is hardly surprising to notice that in Victoria very few monuments were erected to their memory.

However, there are cases where, for one reason or another, the passing of individual Aborigines was commemorated by the erection of a suitable grave stone; and since not many people are aware of the existence of these monuments I have listed them here, so as to bring them to notice; at any rate, they are all I have been able to find during many years of searching for Aboriginal antiquities in this State.

With reference to the grave stones, it will be understood that only those erected over the remains of pure blood Aborigines by persons other than members of their own family will be reviewed here. Examples marking the last resting place of recent Aborigines erected by their own families are not included, since they fall into a class apart and cannot be regarded as public memorials.

BALLARAT.

Over a grave in the New Cemetery at Ballarat there is an obelisk bearing an inscription denoting it to have been erected over "the Resting Place of Frank, last of the Ballarat Tribe of Aborigines".

Frank belonged to the Lake Burrumbeet group of the Wothowurong tribe and as a young man became attached to William Wilson, the owner of Ercildoune Station, which was within the territory of the Lake Burrumbeet group, the Burrumbeet Buluk. Frank became a Wesleyan, and took Wilson as his surname. Towards the end of 1896, when about 75 years of age, he took gravely ill. Mr. Wilson notified the Ballarat Police of his condition and he was taken to the Ballarat Hospital, where he subsequently died. Frank was buried on 26th September, 1896, was buried on 26 September, 1896, his grave being a Special Grant, vested in the Australian Historical Records Society, and the obelisk was erected upon it the following year with funds raised by public subscription.

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There is a story of Frank having a dog, which for a time kept the Police at bay when they came to remove him from Ercildoune, and that it stayed outside the hospital while Frank was there, and followed him to the cemetery, where it was later seen digging a hole on the grave in order to reach its master.

CAMPERDOWN.

Camperdown has the distinction of having Victoria's most beautiful and imposing monument to the Aborigines. It is situated in a dominating position in the centre of the cemetery, and inscribed "In Memory of the Aborigines of this District" as well as "Here lies the body of the chief Wombeetch Puyuun, the last of the local tribes". The face of the obelisk is also decorated with engravings representing a boomerang, a fighting club, a throwing stick, and with the dates, 1840 and 1883. The first is locally believed to have been either the date of Wombeetch's birth or of the beginning of the end of the tribes; the second was the date of his death.

The obelisk was erected by public subscription through the untiring efforts of James Dawson, author of a well known book on the Aborigines of the Western District, and his daughter, to whom we are indebted for lists of the local Aboriginal language. James Dawson was a real friend of the Aborigines, and saw with sorrow their passing. Mrs. Dawson, who was a daughter of Mungo Park, the famous African explorer, also always went out of her way to help the unfortunate remnants of the tribes.

Wombeetch Puyuun, which in English means "The Stench of a Rotting Kangaroo" was locally known as Camperdown George. His uncomplimentary native name was due to the Aboriginal habit of naming children after some happenings or peculiarities of terrain or after the place where they were born. Though he was the last of the Jarcoorts it is unlikely that he ever became a "chief", since by the time that he was old enough to be a headsman there would hardly have been any of his people alive. An early photograph of Camperdown George was published by me in The *Victorian Naturalist*, **83** p. 129, June 1966.

Plate 1 The monument to Wombeetch Puyuun, at Camperdown.

CORANDERRK.

Coranderrk, near Healesville, was an Aboriginal Reserve, and as such had its own cemetery, picturesquely situated on a rise dominating the site of the Reserve. At least 300 Aborigines were buried there, but the only monument marking the last resting place of any of them is over the remains of Berak, the last of the "Yarra" tribe.

In a former paper, (The *Victorian Naturalist*, 76 p. 252, February, 1960) I have given an outline of Berak's life and the history of the monument now over his grave. Since then, however, I have learnt three interesting facts:

1. That the name Berak means "Hot Wind" which must have been blowing when he was born.

2. That his father, Bebe-jern, died of old age at the foot of Yerringberg Hill, close to the Yarra, where he was buried. His body was bent double, his knees touching his chin, and he was enveloped in a kangaroo skin rug and tightly corded; he was not buried in the grounds of the Mental Hospital at Kew as I formerly believed and wrote.

3. That despite the unanimous recommendation by the Board for the Protection of Aborigines, the Honorable the Chief Secretary could not see his way clear "on the grounds of economy" to contribute £20 to the public subscription for erecting the monument to the memory of the last of Melbourne's Aborigines!

DONALD.

In one of Alec Russell's paddocks, south-east of the Little Lake, there is what tradition claims to be an Aboriginal Stockmen's Cemetery. The "cemetery" is within a grassed paddock and is unfenced. The graves are suggested by a number of low mounds, which, although of the right shape, would pass completely unnoticed except for a cement column or post, about four feet high and a foot in diameter, which was "stood up" many years ago; and since it serves no functional purpose, it is possible that it is a grave marker. Tradition is silent as to the identity of the Aboriginal stockmen, but it is recorded that a number of Aborigines were in constant employment on the early local stations, and that several of them distinguished themselves in horse racing and other local sporting events.

EBENEZER.

This Mission Station, which was established near Arkona by the Moravian Board of Missions in January, 1859, looked after the well-being of the Wimmera and Mallee tribes until October, 1904, when it was closed, because there were not enough Aborigines to warrant its continuance. About 150 Aborigines and five Lutheran Missionaries were buried in the little cemetery at the back of the Mission Church; and both it and the ground the Church stands upon have now been declared Permanent Reserves.

Ten grave-stones were erected in this cemetery, five for the missionaries and five for Aborigines, of whom three were born at the Mission; and since these memorials were all put up by surviving members of their families they fall outside the scope of this list. The cemetery is only listed here for the sake of completeness.

EDENHOPE.

A monument of a different kind was erected to the Aborigines on the shores of Lake Wallace at Edenhope. This is an obelisk to mark the fact that the Aboriginal Cricket Team which visited England in 1868, the first of any race to visit the Mother Country, trained and set off from there. As is well known, the team's Manager was W. R. Hayman, and the Captain C. Lawrence. The Aborigines composing the team were: Mullagh, Dick-a-Dick, Towpenny, Red Cap, Mosquito, King Cole, Peter, Cuzens, Tiger, Jim Crow, Bullocky, Dumas, and Sundown. In

England they played 47 matches, winning 14, losing 14, the remaining 19 being drawn.

GEELONG.

There are two cemeteries at Geelong, and there is a memorial to Aborigines in both of them. In the Eastern Cemetery an upright cross marks the grave of Billy Leigh, who was 'King' of the Yawangi, as the tribal group who owned the You Yangs was called. Billy and his group were 'adopted' by Frederick Armytage and his wife, the then owners of Wooloomanata Station. Billy was baptised and confirmed in the Church of England at Lara, and when he died in August 1912, the last of his group, the Armytages erected the cross over his grave, at the base of which there is a tablet stating that

Plate 2 Grave of Billy Leigh — Geelong Eastern Cemetery.

Billy had been a friend of the family for over 60 years. A second tablet affixed to the grave reads:

> Coo-ee, coo-ee, Billy Leigh.
> Station mates in sympathy
> grieved in spirit, one and all
> joined together in the call
> of farewell we send to thee.
> Coo-ee, coo-ee, Billy Leigh.

The last seven Aborigines of the once powerful Geelong or Wothowurong tribe, sleep in three adjoining graves which they share in common in the Western Cemetery. That they are buried there is due to the humane sentiments of a former Mayor of Geelong, Robert de Bruce Johnstone, who saw to their comfort when living and provided a place for them to rest undisturbed when dead. The Aborigines buried there are:

Dick, who died on	24.2.1862
Ellen,	25.11.1864
Jemmy Nelson,	25.4.1866
Timboo	25.12.1866
Harry Gore	25.3.1868
King Jerry, (Dan Dan Nook)	23.8.1870
King Billy Gore	11.11.1885

King Billy Gore, the last Barrabool man, was born on the site of the present parking station in Jacob's Street, Geelong, and was given the name of "Worm Bunyip" by his father, Wa-wa, because that day he saw a bunyip at Worm (Waurn Ponds) where he had gone hunting. This name was engraved on the brass "king plate" which Billy Gore wore to the last of his days.

Photographs of King Billy Gore and most other Aborigines named in this article are a feature of my forthcoming book *Journey to Aboriginal Victoria.*

HARROW.

At Harrow Cricket Ground there is a monument commemorating Johnny Mullagh's victories. He deserved it:

his batting average for the English Tour was 23.65 runs, and he made 1,690 runs and took 245 wickets. However, when he returned from England he gradually lapsed into obscurity, and lived his last days in a humpy near a swamp at the back of W. B. Edgar's Pine Hill Estate, near Harrow. When he died his bat and knee pads were placed in the coffin and buried with him in the Harrow Cemetery. The headstone on his grave reads:

Here lies Johnny Mullagh, (Aboriginal) World Famed Cricketer. Born, 1843 died 14th. Aug. 1891.

LAKE CONDAH.

The little native cemetery attached to this former Church of England Mission Station was declared a Permanent Reserve in 1951. Aborigines belonging to the mission have been buried there since the year 1867; and it is still being used as a burying place by their modern descendants who live scattered about the district. However, there are only three grave stones in the cemetery, the inscription of one is illegible and the other two belong to Aborigines born at the mission. These stones having been erected by members of the family of the deceased will not be described; but it could be useful to know that they are there.

MELBOURNE.

In the Melbourne General Cemetery there is a grave stone of more than usual historical interest. The inscription upon it reads that it was "Erected by a few colonists to commemorate the noble act of the native chief Derrimut, who by timely information given October 1835 to the first colonists, Messrs. Fawkner, Lancey, Evans, Henry Batman and their dependants saved them from massacre planned by some of the up-country tribes of Aborigines. Derrimut closed his mortal career in the Benevolent Asylum, 28 May, 1864, aged about 54 years".

Herein lies the story of a drama the details of which, left in manuscript by John Pascoe Fawkner, were published in the La Trobe Library Journal, Vol. I, No. 3, 1969. An interesting article on Derrimut and a photograph of the grave stone were published in The *Victorian Naturalist*, **79**, February, 1963.

The name Derrimut was variously spelt by the old writers, and forms such as Derrimot, Derriemert, Derrimart, Derrihmart, Derah Mat, and Derrahmert, are seen. The correct form should probably be Derrahmut, in which case the meaning of the name would be "To Pursue" or "To Hunt". Derrimut's "noble" act was, of course, the betrayal of his people.

Plate 3 Monument to Johnny Mullagh, at Harrow.

MILDURA.

Mary Woorlong was the last pure blood Aboriginal of the Mildura District. She was the third wife of the Werlong, or Woorlong, or Whorlong, of the Euston tribe, who was born about 1837, and taken to England, Ireland, and France by the late Mrs. McCallum of Youngera Station. During this trip he threw the boomerang before Queen Victoria, in 1859, to show her how it was done. He died about 1914.

I have not been able to find any particulars about Mary, other than that she was a kind person, full of womanly understanding and charity. She died on 11 November, 1942, and was buried at the Mildura Cemetery. Her neat grave features a headstone on which there is a rendering of a boomerang in high relief, inscribed with the words:

"Mary returns home".

Underneath it appears her profile shown as a black silhouette on the white stone; and below that again the words "Last of the Kulkine Tribe". Her name and the date of her death are shown at the foot of the grave. It is a simple, yet effective memorial.

Plate 4 Grave of King Charles Tattambo, at Murchison.

MURCHISON.

In the Murchison Cemetery an unusual grave marks the last resting place of King Charles Tattambo. It is enclosed in an iron railing, the four sides of which are shaped like spoked wheels, and the four corner "posts" and two central uprights represent up-standing spears. On the top edge of both the front and the back "wheels" two shorter spears support respectively Tattambo's "king plate" and a brass boomerang.

The king plate, which must have been a proud possession, is inscribed with the words "Tattambo King Molka Station" and, in smaller characters, the bitter reminder:

"Belonging to Mr. Fryer".

The centre of the plate is occupied by a small rendition of an Aboriginal carrying a shield and with spear poised for throwing. The boomerang bears the simple inscription "Tattambo, died Sept. 1865".

This grave is also occupied by Tattambo's last wife, Queen Mary. She died suddenly, on 24 October, 1867, when returning from the cemetery where she had seen Captain John, Tattambo's son (but not her's) being buried in a grave next to his father's. The next day her husband's grave was opened and her coffin placed on top of his.

NAREEB-NAREEB.

In the graveyard at Nareeb-Nareeb Station there is a hand-hewn headstone incised with the name "Barring-

bittarney" and the date "1878". In his reminiscences, published under the title "Western Victoria in the Forties" Charles Gray, who was a former owner of the station, wrote that Timour (Barringbittarney) was the head of the tribe, and that when he died at an advanced age he was buried by his own people. Two sheets of bark were cut from a large gum tree, and his body was sandwiched between them and tied with kangaroo sinews, and then interred in the little grave yard. A photograph of the headstone which was later placed over the grave appears in The *Victorian Naturalist,* **85**, November, 1968.

RAMAHYUCK.

This was a Moravian Mission Station established in June, 1863, near Lake Wellington, in Gippsland, and closed in March, 1908. The land belonging to it has been subdivided by the Soldier Settlement Commission, and all that remains to mark the site of the mission is the little cemetery, unfenced and grazed upon by cattle and only recognised as such by a number of little mounds and by three headstones, which, however, have been pushed over by the cattle. Two of these stones are white, and mark the resting place of early white settlers in the district. The third one is black, and though the inscription has worn off, I have been able to show in my "History of Ramahyuck", that this is the stone erected by the missionary over the grave of his first Aboriginal convert, Nathanael Pepper.

Nathanael, a native of Lake Hindmarsh, in the Mallee, was baptised at Ebenezer Mission Station, and later travelled to Ramahyuck to join Hagenauer, the missionary who had converted him. He became a preacher on his own account, and was instrumental in baptizing a number of Aborigines. He died on 7 March, 1877.

SWAN HILL.

Aggie Edwards was the last pure blood Aborigine of the Swan Hill District. A gentle, frail but tall woman, she was born in the late 1880's at Moolpa Station, between Swan Hill and Balranald, N.S.W. Her father was King Wilson; he came from the Murrumbidgee and when he died was buried at Lake Tooin on Murray Downs Station. When quite young Aggie was married to Harry Edwards, a pure blooded Aborigine old enough to be her father, and they camped for a number of years on J. Nesbitt's Estate, about 12 miles downstream from Swan Hill but on the N.S.W. side of the Murray. Speewa Island was also a favourite camping place.

Harry died in 1912, and Aggie never remarried. She died in November, 1928 and was buried in the Swan Hill Cemetery. In 1930 the Swan Hill Branch of the A.N.A. "fixed up" her grave, and erected a headstone on which is written:

In Memory of Aggie Edwards, last Queen of Moolpa tribe of Aboriginals, died Nov. 1928. Erected by Swan Hill Branch A.N.A.

* * * *

This completes the list of monuments erected in Victoria to the memory of the first Australians. It is short enough, which lends weight to the correctness of my thinking as set out in the introduction. One would think that the Government of Victoria would see fit to erect a monument in a prominent position as a memorial to the departed tribes. It would both grace the City and show that it has a conscience.

Field Naturalists Club of Victoria

General Meeting

14 September, 1970

The meeting was opened by Mr. T. Sault, the President, who extended a welcome to the 70 members and guests present.

Mr. Sault announced with regret the deaths of two longstanding members of the club. They were Miss M. Elder of Kallista, and Mr. N. Learmonth of Portland. Mr. J. Willis said that the deaths of these two members was a great loss to the Natural History field as both were active and well known. Miss Elder, a former Council member, was active in the Bird Observers Club and the Native Plants Preservation Society and had travelled widely in Australia and abroad. Mr. Noel Learmonth, who was 90 years of age, was a very hospitable person and had enjoyed a rich and rewarding life to the end. He was a founder of the Portland Field Naturalists Club and had also written a history of that district.

Miss Young informed the meeting of the death of another old member, Mrs. Fred Lewis.

A visitor to the meeting was Mr. A. Chisholm, a former Editor of the Victorian Naturalist, now residing in Sydney. Mr. Chisholm spoke of his long association with the club and wished it well for the future. Also present was Mr. I. Hammett who has been a member of the club for 40 years.

Correspondence tabled by the Secretary included a reply from the Fisheries and Wildlife Dept. regarding the action to be taken on conservation of penguins at Phillip Island, a letter from Mr. W. A. Borthwick, Minister of Lands, stating that the application for a lease in the Mt. Napier district had been rejected and the area was to be assessed with consideration being given to the establishment of a national park. Mr. D. Lee showed a slide of Mt. Napier which illustrated the mountain and surrounding countryside.

A letter of thanks was received from Mr. Pescott, expressing his pleasure for the dinner and presentation given him by club members on his retirement.

Letters were also received from the Post Office concerning increased postal charges for the magazine, the Tasmanian F.N.C. asking for advice on club study groups and publishing, and the Wychitella Forest Protection League with further information on the proposed national park for this area.

Mr. Bill Saxton, of "Binnalong", Tumbarumba, N.S.W., wrote regarding vandalism to aboriginal camp sites, rock paintings, etc., particularly in the Upper Murray area, after publicity is given to their discovery. He suggested we make an effort to have legislation enacted to protect such finds from commercial exploitation as is done in N.S.W.

The guest speaker for the evening was Mr. A. O. Lawrence, O.B.E., Chairman of the C.C.V. and recently retired Chairman of the Forests Commission, whose subject was "The Conservation Movement in Victoria". Mr. Lawrence outlined the growth of the conservation movement from the beginning of the century when forests were used wastefully because of the bountiful supply. Originating in Western Europe, conservation was defined as "the wise use of resources". In Australia, the beginning at federal level, was the conservation of water resources and later the conservation of soil. The development of new groups interested in all branches of natural history, led the movement into a wider field and such bodies as the National Parks Association were formed. Further moves were for the preservation of the environment as a whole, including pollution of all forms; soil, water, air, etc. To obtain the co-operation of all interested bodies, the C.C.V. was set up and it is now active with 55 member organisations covering all aspects of conservation in Victoria. The recently introduced Land Resources Bill has been studied by the Council and it is believed to contain significant improvements for the wise use of Crown Lands. Mr. Sault thanked Mr. Lawrence for his informative talk which was received with great interest by members.

Notice of Gratitude

The Halafoff Family wish to express their sincere gratitude to Dr. L. H. Smith for a sensitive and superbly written obituary of Late K. C. Halafoff.

Botany Group Meeting

10 September, 1970

Mr. Fell was the speaker at this meeting. His subject was "The Ecology of Western Australian Plants", ecology being the relationship of plants to their general environment and to each other. Maps of the floral areas of Western Australia were shown.

Mr. Fell said he was confining the talk to the south-west area, excluding the Mallee country. He found that plants usually followed the soil lines rather than the rainfall. One of the main points discussed was the size of trees and smaller plants. For instance, *Eucalyptus tetragona* is a Mallee of three feet in some places and a tree of thirty feet in others. The Jarrah, Karri and Tingle areas were mentioned and the high rainfall here, also the terrible devastation caused by close settlement, burning and the building of roads.

Mr. Fell spoke of the delineation divergence of the floral areas by Deal and Gardner. The talk was illustrated by pictures from the forest areas, the Darling and Stirling Ranges, Bremmer Bay, Esperance sands, the estuaries of the Pallinup and Gardner Rivers.

Mr. Fell answered various questions. Then Mr. Fairhall thanked Mr. Fell for his interesting talk and beautiful pictures, saying how members were saddened by the devastation, and recalling a happy occasion of lunchtime in Mr. Fell's W.A. garden.

Botany Group Excursion to Anglesea and Airey's Inlet on 10-11 Oct. Members please bring $3 deposit to group meeting on Thurs., 8 Oct.

Geology Group Excursions

Sunday, 11 October — To Heathcote and district (previously advertised for 9 August).

Sunday, 8 November — To Kinglake. Leader: Mr. George Carlos.

Transport is by private car. Spare seats are usually available for those without their own transport. Excursions leave from the western end of Flinders Street Station, opposite the C.T.A. Building at 9.30 a.m.

No excursions are planned for **December, 1970,** and **January, 1971.**

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All microscope enthusiasts and members of the Microscopical Group are invited to a special evening, the celebration of Mr. Cliff Nance's fiftieth year as a practical amateur microscopist, on 21 October.

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Vol. 87, No. 11 November, 1970

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Front Cover:

This delightful photograph of the Sugar Glider was taken by John Wallace, of Caulfield.

Shore Potholes at Diamond Bay, Victoria

by

E. C. F. Bird*

Potholes are smooth circular depressions scoured in a rock surface by fragments of rock circulated by the action of flowing water. They are often found in the beds of river channels, and also occur on rocky shores, where wave action generates the necessary water circulation. Shore potholes have been reported from various parts of the world (Dionne, 1964), and good examples are found on the ocean coast of the Nepean peninsula, on the southern side of Port Phillip Bay, Victoria (Fig. 1).

The Nepean peninsula consists of dune calcarenite, a sandy calcareous material otherwise known as aeolian calcarenite, calcareous aeolianite, or dune limestone. It has been built up as a sequence of overlapping dune formations, partially lithified by secondary carbonate deposition. Superficial unconsolidated dunes, some held in position by vegetation, others active and spilling landward, are of Recent age, but the underlying calcarenite contains fossil remains of extinct giant kangaroo species, and is of Pleistocene origin (Gregory, 1901).

The dune calcarenite includes sandy formations with strongly-developed dune bedding, homogeneous dune sandstones, and layers of hard calcrete rock, often with reddish-brown buried soil horizons (palaeosols) and relics of associated vegetation in the form of branched cylindrical root tubes preserved in calcrete (rhizoconcretions). Each of these formations is exposed on the ocean coast (Plate 1) where in Recent times the southern margin of the peninsula has been cut back by marine denudation to form rugged cliffs fronted by almost horizontal shore platforms. Rocky promontories and stacks occur where the more resistant layers outcrop close to high tide level, and embayments such as Diamond Bay on intervening sectors where the less indurated dune sands have been scoured away by wave action between high and low tide level. The shore platform is broad and smooth where it is developed on homogeneous dune sandstone, but there are minor irregularities where it is crossed by outcrops of stratified dune sand and protruding reefs on outcrops of hard calcrete. Beaches

*Reader in Geography, University of Melbourne.

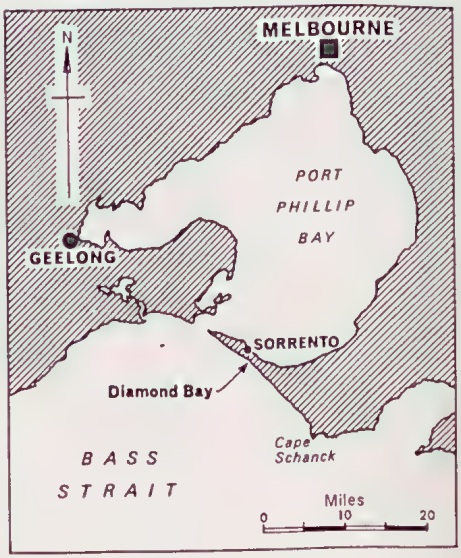

Fig. 1

Plate 1 Western shore of Diamond Bay, showing basal calcrete ledge with cylindrical depressions, overlying buried soil horizon, bedded dune sands with rhizoconcretions, and unconsolidated dune sands overlying another buried soil horizon near the top of the cliff.

are of limited extent, and consist of sand eroded from the cliffs, augmented locally by pebbles and cobbles formed from the more resistant calcrete layers.

Where this coarser material is available, potholes may be found on the adjacent shore. Stones lodged in crevices on the shore platform are moved to and fro by wave action, and as a hollow is scoured out the gravel becomes smoothed and rounded, and reduced in size by gradual attrition. The excavated hollows are typically circular in outline and hemispherical in shape. Neighbouring potholes may grow and coalesce through the breaching of intervening ridges (Plate 2). Some potholes have been cut out by the agency of a single large stone, others by the circulation of a quantity of gravel (Plate 3). If the supply of abrasive material is maintained, cylindrical hollows may be drilled out to depths of more than a metre, but if the abrasive material is washed out during a major storm, or if it disappears as the result of continued attrition, the scouring process comes to an end and the pothole loses its smooth, freshly-scoured appearance. Potholes no longer subject to scour are usually colonised by marine plant growth, notably the sea grape, *Hormosira.*

As well as potholes produced by abrasion there are various other depressions produced by weathering processes. They include features classified as pits and pans by Went-

Plate 2 Shore potholes formed largely by abrasion.

worth (1940), marine solution basins by Emery (1946), and flat-bottomed pools by Guilcher (1958). Weathering processes involved in their formation include (1) rock disintegration through repeated wetting and drying, (2) the plucking effects of salt crystallization where sea water, trapped in a hollow above high tide level, evaporates during dry weather, (3) solution by rainwater, (4) solution by groundwater seepage, (5) solution by sea spray and swash, and (6) bioerosion, the physical and chemical effects of the plants and animals which inhabit the shore. Any of these processes may initiate and excavate depressions on the shore, or contribute in some measure to the enlargement of potholes formed primarily by abrasion. For example, the potholes shown in Plate 2 (a photograph taken after a period of calm weather and low tides) contain shelly organisms which etch and scrape the rock walls when the scouring process is latent. The walls of these potholes are also intricately pitted, in a manner suggestive of corrosion. As a pothole is deepened by abrasion the freshly scoured surface migrates downward, leaving the upper parts of the wall, no longer subject to scour by rotating rock fragments, to be pitted by corrosion processes and colonised by shore plants and animals (Plate 3).

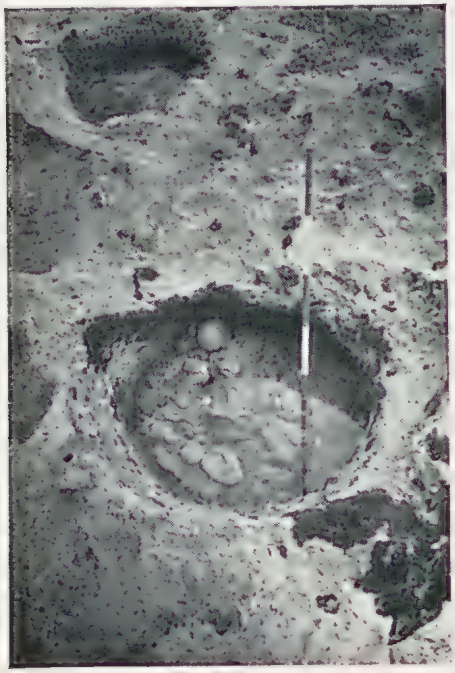

Plate 3 Shore pothole containing abrasive gravels.

Analysis of the effects of the various weathering processes on this dune calcarenite shore is beyond the scope of the present article: the results of a detailed study are to be published subsequently. It is sufficient here to note that in addition to potholes produced entirely by abrasion and depressions produced entirely by weathering processes, there are hybrid forms. Some of the potholes which originated as the result of abrasion have lost their content of rock fragments and are now being enlarged by weathering processes, notably corrosion. Other features originated as weathering depressions, but were then invaded by rock fragments and enlarged and deepened as potholes by abrasion.

An unusual form of pothole is well developed on the western shore of Diamond Bay, where a calcrete layer, overlain by a buried soil horizon, outcrops in the base of the cliff and extends as a ledge along the flanks of a promontory (Plates 1 and 4). The calcrete ledge shows numerous cylindrical depressions, 30-50 cm. in diameter and often more than a metre deep (Plate 5). At first sight they look like potholes, and

Plate 4
Calcrete layer with cylindrical depressions.

some of them have indeed been invaded by rock fragments and deepened by abrasion, but close examination of the calcrete layer at the base of the cliff shows that these cylindrical depressions have been derived from soil pipes found beneath the buried soil horizon (Plate 6).

Soil pipes are cylindrical hollows which develop in limestone terrain as the result of subsoil solution processes. Their probable mode of formation in Diamond Bay is shown in Fig. 2. It is likely that they were initiated where shrubs or trees growing on the stabilized surface of a dune sent down prominent vertical roots through the surface soil into the underlying calcrete layer. When the plants died and these roots

Plate 5 Cylindrical depressions derived from soil pipes in a calcrete layer.

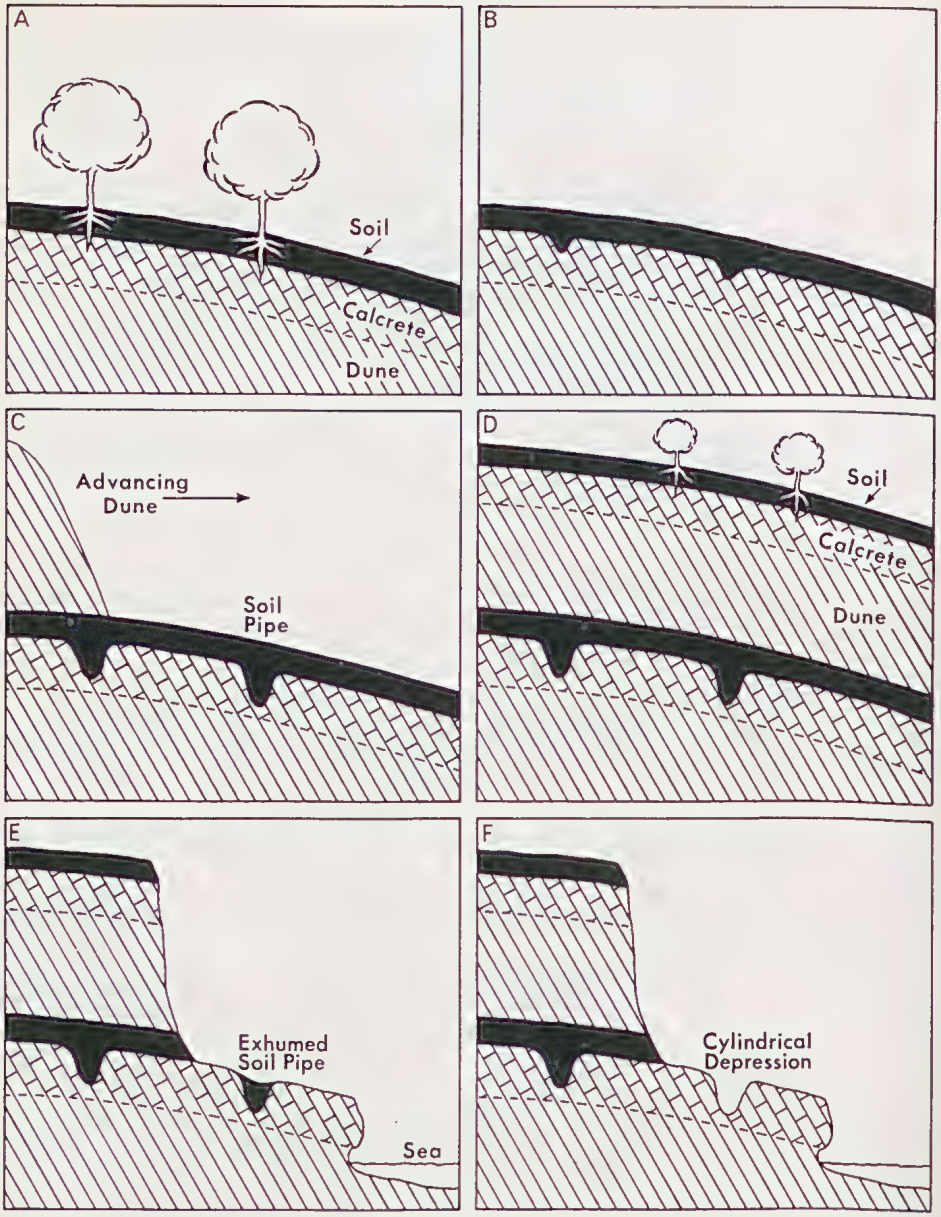

Fig. 2 Evolution of soil pipes and cylindrical depressions.

decayed, soil material subsided into the hollow thus produced, and percolating rain water, corrosive because of its dissolved content of atmospheric carbon dioxide, then drained through the hollow, progressively dissolving away calcium carbonate from its base. In this way the hollow steadily deepened, and more soil material was washed into it. At the same time, much of the dissolved calcium carbonate was precipitated in the underlying and bordering calcarenite in such a way as to form a strongly lithified surround.

The soil horizon, with its underlying soil pipes, developed during a past phase of stability in the dune landscape. It was buried, together with its associated vegetation, when a younger dune (indicated by the strongly-bedded dune sand in Plate 2) migrated across the area (Fig. 2, C and D). Development of the soil pipes was then arrested, for rain water percolating through the overlying calcareous sand would be saturated with dissolved carbonates by the time it reached the buried soil, and thus incapable of further solution.

Much later, when marine denudation exposed the buried soil horizon and laid bare the calcrete layer, soft soil material was readily washed out of the soil pipes by wave action, thus producing empty cylindrical depressions (Fig. 2, E and F). Locally, at the base of the cliff, the calcrete layer has been undercut, and the cylindrical depressions are bottomless (Plate 7). Farther out, on a ledge bordering a promontory, the washed-out soil pipes are being enlarged by corrosion (Plate 5). Where the calcrete layer dips beneath high tide level, several of the washed-out soil pipes have acquired rock fragments that are circulated by wave action in such a way as to convert

Plate 6
Soil pipes exposed in cliff section.

Plate 7 Cylindrical hollow in undercut calcrete ledge.

them into abrasion potholes. Towards low tide level, most of the washed-out potholes are choked with weed growth (Plate 4), and some have become filled with sand. In the middle of the bay, vase-like structures have developed (Plate 8) where the carbonate-enriched surround of washed-out clay pipes persists after the removal of surrounding, less indurated dune rock.

The shores of Diamond Bay thus show (1) potholes formed by abrasion, (2) depressions produced by weathering processes, (3) hollows formed by the washing-out of soil pipes and (4) depressions of composite origin.

Acknowledgement

I am grateful to H. J. Collier for assistance with the Figures, and N. Rosengren for help with the Plates.

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Plate 8 Vase-like structure left where indurated surround of a soil pipe persists after soil has been washed out and surrounding dune rock eroded away. Rock fragments have invaded the hollow, which is now being excavated as a pothole by abrasion.

Bird Notes on the Western Fringe of the Simpson Desert

by Ellis M. Tucker

On the 26 July 1968, our party led by Cliff Beauglehole (Portland), and comprising Bill Corrick (Hamilton), Stan Finck (Heathmere), and myself (Brit Brit), left Alice Springs on our homeward journey after five weeks of botanical collecting in various parts of the Centre. Our intention was to detour through the Western fringe of the Simpson Desert and make a plant collection from that area.

1968 was a remarkable season in Central Australia. After the breaking of the long drought the previous year, heavy and continued rain had transformed the area into a many flowered wilderness. Birds had also returned in large numbers. These were my main interest.

After receiving last minute directions and advice from Staff at the Herbarium, filling all petrol and water containers, we headed the Land Rover south beside the railway line.

Our first stop was to see the ancient rock carvings at Ewaninga; then on to an Easterly digression to the Ooraminna Rock-hole, where we camped for the night. This is a permanent waterhole set among low, rocky hills; and from the cave paintings and acres of camp debris, stone flakes, chips, and grinding stones, it was obviously used by generations of Aborigines as a camp site. It was also used by teamsters as a staging point during the building of the Overland Telegraph Line. At that time, it was the only permanent water between Dalhousie Springs and Alice Springs.

After some delay next morning for the drying of previously collected specimens, and to allow a quick hunt around the area, we packed and headed south again for Deep Well Bore. Here, our track turned to the east, past Deep Well and Allambi Stations. After travelling almost due east for approximately 80 miles, the rolling sandhill plains became wider. We cut the old "Oil Road" running S.S.E. and came through the gap in the last range to see the long straight lines of sandhills fading away to the southern horizon. We knew then that we had arrived in the Simpson Desert. We moved on a few miles until we found a dead tree for firewood, and with the sun setting behind the flat topped range to the north-west, camped.

At that spot, the surrounding country presented an almost park-like appearance. On the flats between the sandhills, which were approximately half a mile apart, there grew a scattering of thick foliaged, upright acacias, from 15 to 20 feet high. Very little bare ground was to be seen. A thick carpet of grasses *(Aristida — Triraphis — Eragrostis — Enneapogon — Diplachne)*, together with Barrier Salt-bush *(Enchylaena tomentosa)*, Blue-bush (*Kochia*), Goodenias, Bassias, Sunrays *(Helipterum)*, Twin-leaf (*Uygophyllum*), and even some Nardoo (*Marsilea*), with many other plants, covered the flats. Only the crests of the sandhills showed red sand ripples. The sides, especially the eastern side, being covered with masses of yellow flowered Groundsels (*Senecio grego-*

rii), Poached Egg Daisies (*Myriocephalus stuartii*), *Trachymene*; and great white masses of Cress spp. (*Cruciferae*). Ragged clumps of Sandhill Canegrass (*Zygochloa paradoxa*) and Roly-Poly (*Salsola kali*), both living and dead, had caught the drifting sand into hills and humps along the ridges.

Soon after dark, we became aware of what was to become one of the bird mysteries of the trip. The 'boo-hoo' calls of pigeons came in from all sides and persisted right through the night. Both with and without torches, we endeavoured to track down the callers, but could never quite locate them. The calls seemed to come from the acacias, but no birds could be seen or flushed. No pigeons had been seen while still light, nor were any seen in the morning, even though we were out at daylight. The call seemed to be that of the Forest Bronzewing, but why the birds would come out to that area to roost and move away before daylight, we could not imagine.

Our track that day ran for over fifty miles south-south-east in a straight line between thirty foot sand ridges. According to our maps we were going down hill at a little over one foot per mile!

To the east and west were exactly similar valleys and ridges, but from our 'road' (an old grader track with wheel tracks left by a Land Rover in the wet a month or so before), our world was limited to the ridges on left and right, with shimmering distance before and behind. But that valley was alive with interest!

Birds were in large numbers, masses of flowering plants and shrubs covered the sloping sides of the sandhills, small stunted trees grew sparsely over the valley floor, and later in the day, patches of shallow water were encountered. As we came out on to a large plain, these became a swamp, with nesting Avocets, Banded Plover and Duck. We were glad then of the old Land Rover tracks, which we followed in a wide detour, for the 'road' disappeared under the waters of the swamp.

By the end of the day we had covered eighty miles, and had turned west to camp a few miles short of the ruins of the deserted "Old Andado" station. For the one day, our bird list totalled 43 species, with our count of individuals at 1,068. This number was from one valley! A valley which in no way differed from the ones on either side; nor the ones on the other side of those. If the hundreds of valleys each contained roughly the same numbers, the bird population of the Simpson Desert at that time must have been little short of astronomical!

Crimson Chats, those brilliant little birds of the out-back spaces, were nesting in the tangled heaps of Roly-Poly (*Salsola kali*). Brown Songlarks, approximately a pair to the mile while the thick cover of the perennial grasses lasted, sang their clockwork song and were no doubt nesting, although no nests were seen. Budgerygahs, too, were feeding all through the grassy flats. They also became less as we travelled south into the swampy areas, and the grasses lessened as the ground cover began to show some effects of salting. It was here we first saw the Orange Chats, which always show a preference for that type of habitat.

As we came south, the tree cover of the valleys became more stunted. The taller acacia species gave way to lower, bushy shrubs, *Cassia, Eremophila, Hakea, Grevillea, Crotolaria,* and *Solanum* were encountered; and it was in this type of

habitat we saw Zebra Finches, White-rumped Miners, White-winged Trillers, Singing Honeyeaters, Hooded Robins and Crested Bellbirds. Two small parties of Cockatiels were seen, also a number of small groups of Galahs. These, with the Budgerygahs, always seemed to be moving in a westerly direction. In one sparsely covered, stony area, a Cinnamon Quail-thrush was seen. Strangely, no Wedge-tailed Eagles were seen, although a huge nest — possibly an old one—was seen in a small acacia, giving the tree a very top-heavy appearance. Brown Hawks, Kestrels and Spotted Harriers were seen at odd intervals right through. Only one Black-shouldered Kite was seen. Willie Wagtail, of course, was there; as also were Pipits. I doubt if any part of out-back Australia could be visited without seeing these two. As for the few Magpies seen, we could never be sure whether they were Black-backed or White-backed, for no two birds seemed to carry the same markings.

Near one bare stony area, with a film of shallow water, two Australian Dotterels were seen. By their behaviour we believed they had a nest, but it could not be found. In the same spot we flushed an Australian Snipe, a bird which should not have been there at that time of the year. It was also in this area that we found the only eucalypt; stunted and twisted in growth to almost a Mallee form, which, in the absence of fruits, we mistook for a River Red Gum. However, this was later identified at the Alice Springs Herbarium as *E. microtheca.*

A number of parties of Fairy Wrens were closely observed. Very few of these were in breeding plumage, and the only positive identification made was of the Blue and White Wren. These always favoured the tangled clumps of Sandhill Canegrass (*Zygochloa paradoxa*), which in some places were up to six feet high, and covered a considerable area. As we met the swampy area to the south, the sandhills on our left faded away, leaving a vast featureless plain away to the south-east. Across this, a single Dingo hurried away.

Here, we turned west, and after detouring around large sheets of water, pursued by excited Avocets and Banded Plovers, we were forced to travel on for several miles after dark before finding two small dead Mulgas for our camp fire.

In the morning, the sunrise from the top of a sand-ridge was a sight I shall never forget. The sun rose over mirror like sheets of water to the east, and the first rays made the sandhills behind me glow to an almost luminous red. The view in front reminded me of pictures I had seen of the Arctic tundra, making it hard to realise I was looking out over an Australian desert.

From this camp the only addition to our bird list was at the ruins of the "Old Andado" homestead. This had been completely taken over by Fairy Martins, and under every remaining roof their bottled-shaped mud nests covered all available space. One-hundred-and-two birds hawking insects over a nearby pool were counted.

The following is our bird list for the one day — 28/7/68:

Little Quail	1
Crested Pigeon	4
Banded Plover	8
Aust. Dotterel	2
Red-necked Avocet	29
Aust. Snipe	1
White faced Heron	4
Grey Teal	6
Spotted Harrier	4
Black shouldered Kite	1
Brown Hawk	9
Nankeen Kestrel	6

Galah	70
Cockatiel	15
Budgerygah	352
Pallid Cuckoo	3
Bronze Cuckoo Sp.	2
Welcome Swallow	1
Willie Wagtail	4
Hooded Robin	3
Western Thrush	2
Crested Bellbird	2
Little Cuckoo Shrike	1
White-winged Triller	15
Cinnamon Quail-thrush	1
Crimson Chat	195
Orange Chat	42
Chestnut-tailed Thornbill	4
Yellow-tailed Thornbill	6
Brown Songlark	86
Rufous Songlark	1
Blue and White Wren	10
White-browed Woodswallow	4
Masked Woodswallow	4
Black-faced Woodswallow	20
Singing Honeyeater	10
White-plumed Honeyeater	2
White-rumped Miner	14
Spiny-cheeked Honeyeater	1
Aust. Pipit	10
Zebra Finch	57
Aust. Crow	57
Magpie (W-B? B-B?)	5

Acknowledgement:

My thanks are due to Cliff Beaglehole for supply all botanical identifications and checking all references.

Breeding of Common Wombat in Captivity

by

P. Conder

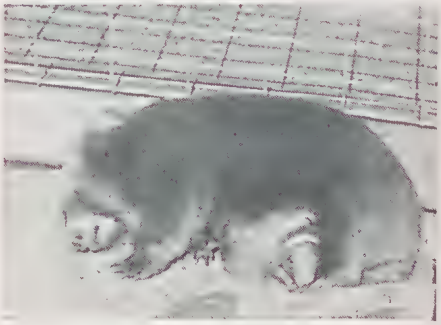
Although the Common Wombat is a relatively common sight in zoos, it rarely breeds in captivity. The animals pictured are in the Sir Colin MacKenzie Sanctuary, Healesville.

The Wombats, aged approximately seven years (male), and five years (female), mated on 9 June, 1969, some two or three years after the birth of their last cub. It was not until December that the youngster was first noticed. Throughout the ensuing months it could be observed, to begin with, moving within the pouch, then later a foot or snout often protruded, as the female progressed about her enclosure or lay in her sleeping compartment. Eventually, the young wombat began to venture forth from the pouch for short periods, usually at night but occasionally during the day, particularly in hot weather.

In early April the youngster, a female weighing seven pounds, vacated her mother's pouch. She grew rapidly, gaining five and a half pounds in three weeks, but for some time would not move further than a few feet from the female. At the time of writing, the young wombat is almost half the size of the adult, and completely independent of her parent.

Acknowledgement

The author wishes to thank Mr. P. McPhee for supplying the information on which this note is based.



Mother, and baby wombat at approximately six months of age.

Photo: P. McPhee.

My Stolen Heritage

This is the end of September 1970, and I have just returned from the bitterest experience in many years of Naturalist activity. I have returned from a 250-mile round day trip taken with a friend, one aim of which was to enjoy again myself, and to introduce another to the lovely Leafy Greenhood (*Pterostylis cucullata*). I have visited the spot a number of times, never to be disappointed, and sometimes to be greeted with a wonderful display.

This time I saw nothing — nothing but holes! Hundreds of holes, where there should have been flowers, or at least leaves to mark their future presence. In the two years since my previous visit this denudation has taken place, much of it obviously this year. The area concerned is within the boundaries of the Wilson's Promontory National Park.

This comes as the unbelievable culmination to a number of similar events noted over a few years, some of which I list here:

(1) 10 to 15 plants of the Metallic Sun-orchid (*Thelymitra epipactoides*) dug from a Western District Crown Land cliff top;

(2) about a dozen rare and recently re-discovered Beard-orchids dug from Rushworth Forest;

(3) another less rare, but still uncommon Beard-orchid removed from a Gippsland roadside area;

(4) many species including a goodly number of the Tall Leek-orchid (*Prasophyllum elatum*) taken from privately owned land and Water Reserve near Belgrave.

I wonder how these people described themselves! Scientists? But no scientist destroys entirely the thing he studies.

Photographers? If so, it is surely unnecessary to take such numbers.

Naturalists? Never! The true naturalist has always been remarkable for the gentleness of his touch upon his environment.

The only conclusion to draw appears to be that the plants must be taken for trading or exchange.

These people whoever they may be are nothing more or less than selfish, selective and systematic destroyers of the natural environment, despoiling areas that have for years been a source of interest, research and joy to unknown numbers of people. I hope they are satisfied when they think of a bushland area, bare of the natural heritage they have stolen from those who loved and cared, a heritage lost to coming generations through their selfishness. I hope, too, that they are satisfied with the heritage of mistrust they have left in the hearts and minds of those who trusted them.

I have discussed this latest devastation with certain of the Park Trustees, and have been assured that those in charge will be alerted and stern measures taken over such occurrences. Heartening as this is, it does not bring back that which is lost.

C. E. Gray.

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Studies in Australian Lichens - 1

by

REX B. FILSON*

In preparation of a monograph of the genus *Cladia* it is necessary to describe two species as new and to make one new combination. As the completion of the monograph will be delayed for some time it is thought best to validate the names by publication herein so that Australian workers can make use of them. Full descriptions, affinities, chemistry and distribution will follow in the later paper.

Four species of *Parmelia* commonly discussed in ecological papers need name changes to *Hypogymnia* and the combinations have been made accordingly.

Cladia corallaizon R. Filson sp. nov.

Clathrina retipora var. *corallaizon* F. Wilson ms.

Species nova ex affinitate *C. retiporae* differt sic: pseudopodetiis crassioribus rigidioribus, fenestellis parvioribus regularius separatis, atque colore viridi-griseo usque stramineo.

HOLOTYPUS — Narrandera — West Wyalong road, 28 miles north of Ardlethan, New South Wales *Rex Filson 5466* 13.10.1963 (MEL 25246).

Thallus fruticose, composed of pseudopodetia up to 5cm. high, in pulvinate clumps up to 12cm. in diam. or occasionally in scattered clusters 3-4 cm. in diam., greenish-grey becoming stramineous with age; *Sterile pseudopodetia* rigid, when dry, horny, 2-3 mm. diameter, dichotomously branched, walls perforate, perforations narrow elliptic, regularly spaced *Cortex*: up to 100 μ thick: *Algal layer* discontinuous, 50-60 μ thick, cells 8-12 μ diam.: *Medulla* compact below the algal layer and loosely filling the whole of the hollow

*National Herbarium of Victoria.

Explanatory Note:

Since the publication of the paper on the Distribution of Epiphytes on Beech Trees at Mt. Donna Buang, several errors have been discovered or have been pointed out. In addition additional specimens of collections were found which have improved the data considerably. It was therefore decided to have the whole paper reprinted as a lift-out that could replace pages 253-268 in the September issue.

The Distribution of Epiphytes on Beech *(Nothofagus cunninghamii)* Trees at Mt. Donna Buang, Victoria

by

Dr. D. H. Ashton* and R. F. McRae*

The zonation of bryophytes, lichens and ferns was recorded in 1963 on recently fallen Beech trees at 3,000 ft. on Mt. Donna Buang, Victoria. The site is wet and frequently mist-laden, and being on a steep southern slope, it receives little direct sunlight on hot summer afternoons.

Beech trunks are frequently gnarled and corrugated and the original plates of bark from younger stages may adhere between multiple fissures. There are therefore many microhabitats for epiphyte establishment, especially amongst the convoluted roots, burls and buttress-like swellings. Some aspect differences were observed on the tree trunks in more exposed positions, but these were not specifically studied. The density and diversity of epiphytes in this forest is considerable, but is much less than that in Tasmanian Beech forests. Two new bryophyte records for the Australian mainland are here reported. We are indebted to Mr. J. H. Willis for pointing out that *Frullania rostrata* is a new liverwort record, and to Dr. Ilma Stone for determining the new moss record, *Ulota cochleata.*

*Botany School, University of Melbourne.

1. *The relationship between tree girth at breast height and butt epiphytes.*

In general the number and profuseness of epiphyte species increases with the size of the trunk. Four to five species were found on trees less than 1 ft. g.b.h. up to heights of 6 ft. However, on trees of 8-10 ft. girth this number was doubled (Table 1). This relationship is probably due to the greater diversity of habitat on the thicker-barked, larger and older trees, but it could also be related to the minimal area for the epiphyte communities.

In general the larger and more frondose liverworts were found at lower levels on the trunk where fern establishment was also more common. The finger fern, *Grammitis billardieri* was found at the lower levels and, also, occasionally the soft tree-fern *Dicksonia antarctica.* The smaller trunks were often surrounded by dense ground ferns (*Polystichum proliferum*) which cast considerable shade around the butt. The large tree bases, on the other hand, tended to be relatively free of ground ferns. There is therefore a large variation in local butt microclimate.

The quantity of trunk-flow, its seepage down furrows and its retention in the thicker bark and humus accumulation in crevices are added complications of the microenvironment.

In general the butt communities were dominated by *Dicranoloma billardieri, D. menziesii, Bazzania adnexa* and *Plagiochila fasciculata* with the *lichens Pseudocyphellaria glabra* (syn. *Sticta glabra*) and *Stereocaulon ramulosum* forming conspicuous patches. The liverwort *Acrobolbus tenellus* (syn. *Tylimanthus tenellus*) is often quite common at the lower levels. The lower strata of the epiphyte communities consist of low mats of varying density of *Chiloscyphus echinellus, Gackstroemia weindorferi* (syn. *Lepidolaena magellanica*), *Frullania rostrata* and *Hypnum cupressiforme.*

2. *Vertical distribution of epiphytes.*

(a) Large trees.

The vertical distribution of epiphytes was recorded at 1-2 ft. intervals along the south to west aspects of the trunk and branches of a tree 95 ft. in height and 8 ft. in girth at breast height. The width of bark quadrats diminished with the taper of the tree from 18 inches at the butt, to 9 inches in the mid trunk, 3 inches in the crown and ¼ inch in the fine branches.

Each plot was one foot long and species were estimated on the Braun Blanquet* scale of + to 5 of increasing cover. The trees studied represent only a small sample of the forest and individual trees differ considerably in their epiphyte population. It is possible that some species on the trunks were not recorded due to the sampling procedure. The conspicuous foliose lichen *Pseudocyphellaria billardieri* up to 12″ diameter, was not recorded, although it was present on other trees.

The results in figure 1 show that the frondose butt-community was dominated by the liverworts *Bazzania adnexa, Acrobolbus tenellus,* and the moss *Dicranoloma billardieri.* The epiphyte zone of the trunk consisted of a complex mat and lichen community dominated by *Frullania rostrata, Hypnum cupressiforme* and the lichens *Pseudocyphellaria glabra, Menegazzia pertusa* (syn. *Parmelia pertusa*) and *Hypogymnia physodes* (syn. *Parmelia physodes*), *Sphaerophorus tener* and *S. melanocarpus.*

The change to this community roughly corresponded to the level of the ground-fern canopy. Within the mat and the lichen zone there is a graduation of both the species and their abundance. In this zone *Cladia aggregata* tends to occur at lower levels and *Metzgeria furcata* at higher levels. Some feet below the commencement of the crown, small plants of the moss *Leptostomum inclinans* also occur.

The crown region microhabitats are complicated by the accumulation of humus in the angles of the branches. On the trunk and main branches the epiphyte community is dominated by cushions of *Leptostomum inclinans* (up to 3-6 inches in diameter) and mats of *Hypnum cupressiforme.* The lichens *Hypogymnia physodes, Parmelia perforata* and *Menegazzia pertusa* are also common. This community continues on the moderately small stems 3-4 inches in diameter on both the main trunk and the lateral branches. On the latter the *Leptostomum* cushions are situated on the upper side and the fronds of *Hypnum* trail down

* (+ = 0-1%, 1 = 1-5%, 2 = 5-25%, 3 = 25-50%, 4 = 50-75%, 5 = 75-100%).

either side in long whisps. It is probably that the reduction of many species in this zone is due to the competition provided by the luxuriant cushions of *Leptostomum inclinans.*

On the finer branches the community becomes more open and consists of tufts of *Leptostomum inclinans, Ulota lutea* and *U. cochleata* with small colonies of *Menegazzia pertusa* and *Usnea florida.* On the ultimate branches only sparse simple erect thalli of *Usnea florida* occur with occasional crustose lichens, *Lecidea cinnibarina* and *Phyllectella* sp.

(b) Small trees.

Small trees 10 to 23 feet in height were also examined and were found to show a similar pattern to the large tree. In the small tree the zonation of species is greatly foreshortened. Small colonies of frondose bryophytes occurred up to 5 ft. on the 23 ft. tree and 2 ft. on the 10 ft. tree. The trunk community again is composed of *Frullania rostrata, Hypnum cupressiforme* and *Pseudocyphellaria* species. *Leptostomum inclinans* cushions are not common on the crowns of the 23 ft. tree and are absent from the 10 ft. tree. The fine branch and twig zone contains *Usnea florida* and *Hypnum cupressiforme* and "whitewash" crustose lichens (*Phyllectella*) (Fig. 2). In general, the conspicuous foliose lichens and tuft moss components of the tall crowns of the forest canopy are missing.

(c) Corticolous succession.

The earliest colonizers are found on 3-year-old branches and are chiefly *Usnea florida* and "whitewash" crustose lichens. At this stage the *Usnea* thalli are only 1 mm. high. On 5-6 year branches they are 2-5 mm. in height and are associated with small *Menegazzia pertusa* and *Ulota cochleata* colonies. From about 10-13 years *Usnea* is branches 10-15 mm. high and associated with *Hypogymnia physodes* and *Parmelia perforata* and *P. tenuirrima.* From 13-18 years on thicker branches, the crown community is well developed with the occurrence of *Hypnum cupressiforme* and *Frullania rostrata* (Fig. 3). *Usnea* and the crustose lichens virtually disappear. In general the lower branches establish a crown community a few years earlier than the upper branches and the horizontal branches develop a much more vigorous community than the vertical branches.

The rate and extent of development is likely to be greatly affected by the local microclimate in the crown. Succession to cushion moss communities on horizontal branches usually only occurs on the upper surface. The lower areas are shaded and drier and bear only simple algal or soredial lichen communities. It is possible that the cushion community dominated by *Leptostomum inclinans* becomes unstable with age and cannot fully recolonize the vertical trunk once the earlier crown branches have fallen. If this is so, the epiphyte communities could develop a lower and more open mat community dominated by *Hypnum* and *Frullania.* The bark flakes of the original young stem may still ahere to the mature trunk and may bear crustose lichens such as *Pertusaria* which may be relics of the earlier communities. It seems that succession in the true sense does not proceed beyond the branch stage since new surfaces are being constantly created by expanding bark furrows of the trunk.

The Relationship between Epiphytes and Environmental Factors:

The documentation of the Beech tree environment within the forest would have been of great interest. However, it was only possible to investigate a few relevant factors.

Bark thickness on the large tree ranges from 8-9 mm. on the butt to 5-6 mm. on the mid trunk, to 3-4 mm. in the crown and 1-2 mm. in the small branches. The twigs have a bark thickness of only 0.2-0.8 mm. The moisture content of the outer bark in winter was near saturation at 70-79% O.D.W. in the crown and 53-69% at the butt. It is likely, however, that the lower bark would have a greater moisture storage due to its greater thickness. In addition, the greater shade, lower temperatures and windspeeds at lower levels in the forest trunk space would be conducive to the development of a marked gradient of humidity.

In order to test the relative resistance of various crowns and butt species to desiccation, several fronds and thallus pieces of different species were suspended over concentrations of sulphuric acid such as to provide

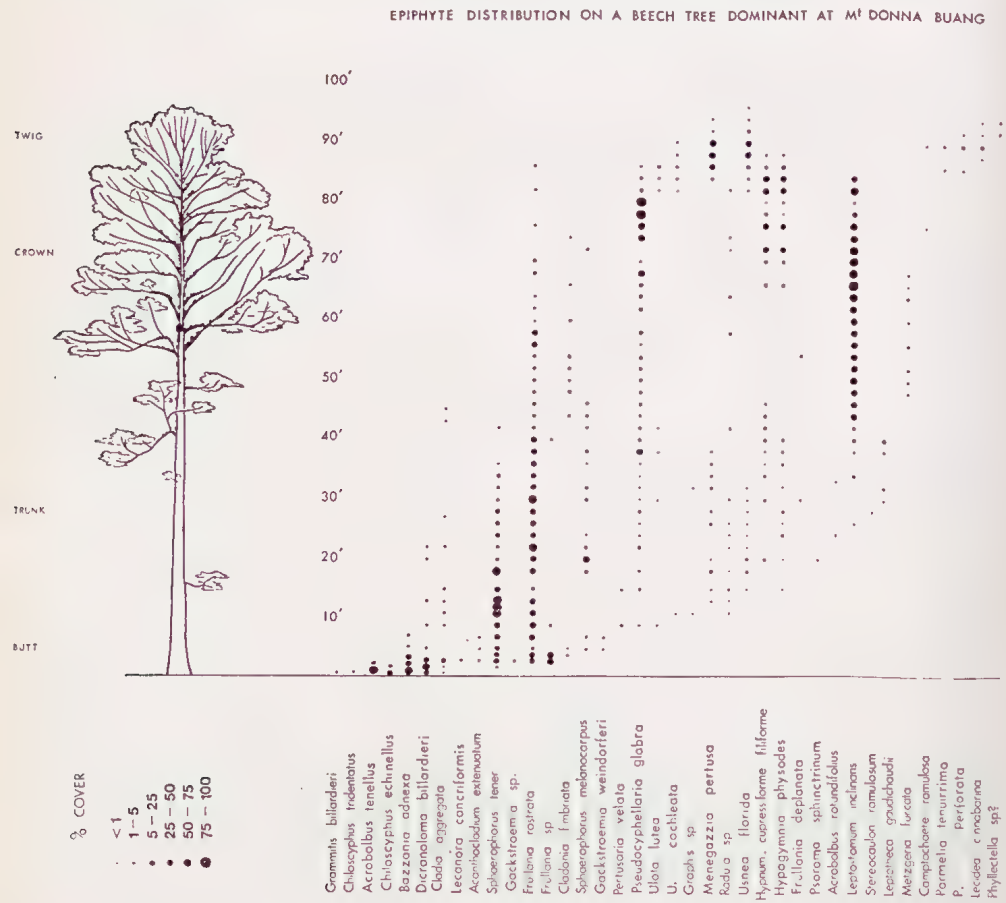


Figure 1.

relative humidities of 0, 25, 50, 75% at 6°, 20° and 32°C. The epiphytes were exposed to these conditions for 3, 12 and 24 hours then re-moistened and their condition assessed qualitatively on a 3 point scale Table 2. The results showed that the species from the butt habitat — *Bazzania adnexa, Cyathophorum bulbosum, Dicranolama billardieri, Gackstroemia weindorferi* and *Pseudocyphellaria glabra* were much more sensitive to desiccation than the trunk and crown species *Hypnum cupressiforme, Frullania rostrata, Leptostomum inclinans* and *Cladia aggregata.*

Even desiccation at 75% discriminated between the two groups. At 50% R.H. damage to both groups increased but the differences remained very marked. Damage at 25% was greater again, but beyond this no increase occurred in the aggregate assessment.

The effect of temperature on the damage sustained was fairly marked. At 32°C damage was distinctly greater than at 20°, but little difference occurred between 20° and 6°C. Time was an important factor. Damage increased greatly from 3 to 12 hours desiccation thereafter little further damage occurred.

The results indicate that *Cyathophorum bulbosum* is the most sensitive species tested, followed by *Gackstroemia weindorferi, Bazzania adnexa, Dicranoloma billardieri* and *Pseudocyphellaria glabra* in that order. The most resistant species tested was *Cladia aggregata* followed by *Leptostomum inclinans, Frullania rostrata* and *Hypnum cupressiforme.*

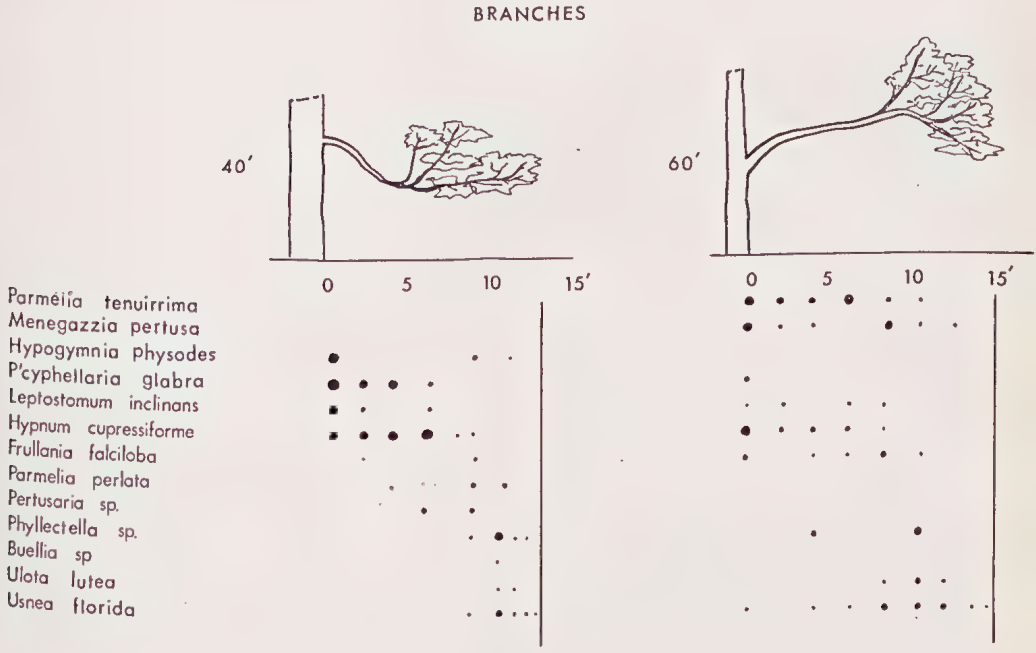


Figure 2.

It is likely that resistance to desiccation is an important feature in the ecology of epiphytes. The larger frondose species are unable to transport water internally from the substrate and are reliant on free water and the high humidity of the air for their continued survival. The killing or continual damaging of the larger species could permit the smaller and often more resistant species to compete and survive. Epiphytes are often sensitive indicators of microclimate; further research on their behaviour would be very rewarding.

Summary

The epiphytic communities on Beech trees (*Nothofagus cunninghamii*) can be divided into butt, trunk, crown and twig communities. Within and between any zone, gradations of species occurrence and profusion can be observed. Corticolous succession can be postulated for the development of communities on branches. A desiccation experiment suggested that marked differential resistance occurs between species normally found on the butt and trunk-crown regions. Such differences in behaviour could be decisive factors in the zonation of epiphytes on the trunk-space of the forest.

Acknowledgements

We gratefully acknowledge the identifications of lichens by Mr. R. Filson, liverworts by Mrs. E. A. Hodgson and mosses by Dr. I. Stone and Mr. J. H. Willis. We are indebted to Mr. J. H. Willis for his helpful and pertinent criticisms. The senior ecology class of 1963 assisted with some of the field work.

Figure 3.

TABLE 1

Epiphytes on Beech Butts of different size.

Ht.	0 – 2 ft.					4½ – 6 ft.				
GBH	0–1	3–4	6–7	8–9	>10	0–1	3–4	6–7	8–9	>10
Acrobolbus tenellus	x		x	x						
Dicranoloma menziesii	x	x		x			x		x	
Dicranoloma billardieri	x		x	x			x	x	x	
Acrobolbus rotundifolius		x	x	x	x	x	x	x		x
Hypnum cupressiforme						x				
Pseudocyphellaria glabra			x		x	x	x	x	x	
Sphaerophorus melanocarpus				x		x	x	x	x	
Plagiochila fasciculata		x	x	x			x	x	x	
Frullania rostrata		x			x		x	x	x	x
Cladia aggegrata		x		x	x		x	x		
Bazzania adnexa			x	x	x				x	
Grammitis billardieri			x	x	x					
Chiloscyphus echinellus			x		x			x		
Radula sp.							x			x
Stereocaulon ramulosum					x		x			
Sphaerophorus tener									x	x
Gackstroemia weindorferi				x	x			x	x	
Lepicolea scolopendra									x	
Lophocolea australis									x	
Pertusaria velata										x
Metzgeria sp.										x
Rhizogonium minioides										x
Cladonia squamata					x					
Dicksonia antarctica					x					

Footnote for table 2 (pages 260-261).

ORDER OF SPECIES:

Crown species

(a) Hypnum cupressiforme
(b) Frullania rostrata
(c) Leptostomum inclinans
(d) Cladia aggregata

Butt species

(e) Cyathophorum bulbosum
(f) Dicranoloma menziesii
(g) Gackstroemia weindorferi
(h) Stereocaulon tener
(i) Bazzania adnexa

TABLE 2

Damage to Epiphytes at Different Temperatures and Relative Humidities.

x Damage Slight or none.

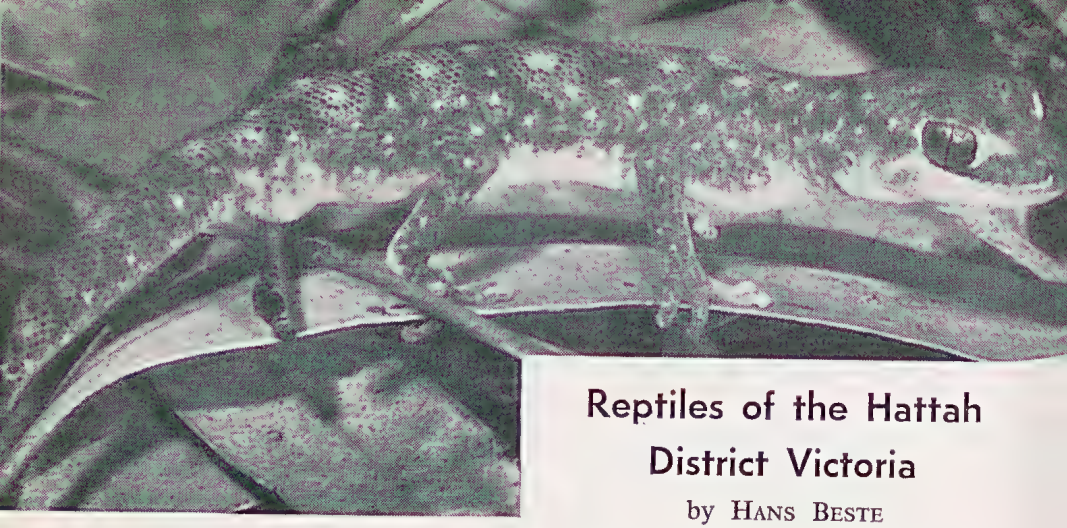
xx Damage Moderate.

xxx Dead.

Species (a) – (i): see footnote page 259.

Rel. Humidity Temp.	Time	0% R.H.		25% R.H.		50% R.H.		75% R.H.		100% R.H.	
		Crown	Butt	Crown	Butt	Crown	Butt	Crown	Butt	Crown	Butt
32° C	3 hours	(a) xx	(e) xxx	xx	xxx	xx	xxx	x	xx	x	x
		(b)	(f) xxx	x	x		x	x	x	x	x
		(c) xx	(g) xxx	x	xx	x	xx	x	xx	x	x
		(d) x	(h) xx	x	x	x	x	x	x	x	xx
			(i) xxx		xx		xx		x		x
	12 hours	(a) xx	(e) xxx	xxx	xxx	xxx	xxx	x	xxx	x	x
		(b) xx	(f) xx	xxx	xxx	xxx	xxx	x	x	x	x
		(c) x	(g) xx	xx	xxx	xxx	xxx	x	xx	x	x
		(d) xx	(h) xxx	xxx	xxx	xxx	xxx	x	x	xx	xx
			(i) xx		xxx		xx		x		x
	24 hours	(a) xx	(e) xxx	xx	xx	xx	xxx	x	xxx	x	x
		(b) xx	(f) xx	xx	xx		xx		xx	x	x
		(c) x	(g) xx	x	xxx	x	xx	x	xxx	x	x
		(d) x	(h) xx	xx	xx	x	x	x	xx	xx	xx
			(i) xx		xx		xx		xx		x

20° C	3 hours	(a) x	(e) xx	x	xx	x	x	x	x	x	x
		(b) x	(f) xx	x	x	x	x	x	x	x	x
		(c) x	(g) xx	x	xx	x	x	x	x	x	x
		(d) x	(h) xx	x	x	x	xx	x	x	x	x
			(i) xx		x		x		x		x
	12 hours	(a) x	(e) xxx	x	xxx	x	xx	x	xx	x	x
		(b)	(f) xx	xx	xx	x	x	x	x	x	x
		(c) x	(g) x	x	xx	x	xx	x	xx	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		xx		x		x
	24 hours	(a) x	(e) xxx	x	xx	x	xx	x	x	x	x
		(b)	(f) xx	x	xx	x	x	x	x	x	x
		(c) x	(g) xxx	x	xx	x	xx	x	x	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		xx		x		x
6° C	3 hours	(a) x	(e) xx	x	xx	x	xx	x	x	x	x
		(b) x	(f) xx		x	x	x	x	x	x	x
		(c) x	(g) xxx	x	xxx	x	x	x	x	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		x		x		x
	12 hours	(a) xx	(e) xxx	x	xxx	x	xxx	x	xx	x	x
		(b)	(f) xx		xx		xx	xx	x	x	x
		(c) x	(g) xx	x	xx	x	x	x	xx	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		x		x		x
	24 hours	(a) xx	(e) xxx	xx	xxx	x	xx	xx	x	x	x
		(b) xx	(f) xx	x	xx	x	x		x	x	x
		(c) x	(g) xxx	x	xx	x	xx	x	x	x	x
		(d) x	(h) x	x	x	x	x	x	x	x	x
			(i) xx		xx		xx		x		x



Reptiles of the Hattah District Victoria

by Hans Beste

A total of fifty-two days was spent by the writer and an additional party of two in the Hattah region of N.W. Victoria, during three fieldtrips between 16 September and 4 December 1969. A particular effort was made to locate and identify as many reptiles as possible, and although 26 species were found in a rather restricted area, these are by no means the only reptiles that have been found in that part of the state.

The areas studied were a 180,000 acre leasehold at Hattah, the environs of Hattah, and a freehold of 1,300 acres on the River Murray.

The first two areas can be described roughly as mallee with open plains, and the third as River Red Gum flood plains. The weather was mostly mild during the time spent in the area, which would have contributed to the fact that reptiles were sometimes rather scarce, and that some species that are known to be in the area were not sighted at all.

The elapine generic names are those as adopted by P. A. Rawlinson (1966) i.e. (Kinghorn 1956) and subsequent changes in scincidae (pers. comm. Rawlinson). Not all of the species found have common names, but wherever possible a common name is given, without following any particular author.

The Title Block illustrates the gecko **Diplodactylus tesselatus.**

	Area where found (*See Fig. 1*)
Chelonia	
Chelyidae	
Chelodina expansa (Broad-shelled Tortoise)	3
Chelodina longicollis (Long-necked Tortoise)	3
Emydura macquarrii (Macquarrii Tortoise)	3
Squamata	
Lacertilia	
Agamidae	
Amphibolurus barbatus (Bearded Dragon)	1, 2, 3
Amphibolurus fordi (Mallee Dragon)	1
Amphibolurus muricatus (Jacky Lizard)	1, 2
Amphibolurus pictus (Painted Dragon)	1, 2
Physignathus gilberti (?)	1

GEKKONIDAE

Diplodactylus strophurus intermedius	2
Diplodactylus tesselatus	3
Gehyra variegata (House Gecko)	1, 2, 3
Diplodactylus damaeus (Beaded Gecko)	1, 2
Phyllodactylus marmoratus (Marbled Gecko)	3

PYGOPODIDAE

Delma fraseri (Fraser's Legless Lizard)	1
Lialis burtonis (Burton's Legless Lizard)	1, 2

SCINCIDAE

Ablepharus boutonii (Wall Lizard)	3
Ablepharus lineoocellatus	1, 2, 3
Egernia inornata (Desert Skink)	1
Ctenotus lesueurii (Striped Skink)	1, 2
Ctenotus sp? (a specimen of an undescribed species was collected)	1
Tiliqua occipitalis (Western Bluetongue)	1
Tiliqua rugosa (Shingleback)	1, 2, 3

VARANIDAE

Varanus gouldii (Gould's Sand Goanna)	1, 2, 3
Varanus varius (Lace Monitor)	3

OPHIDIA
ELAPIDAE

Demansia textilis (Common Brown Snake)	1, 2, 3

TYPHLOPIDAE

Typhlops australis	2

Acknowledgements:

The author wishes to thank the following people for the help that they have given him and his party, while doing the field study and by helping with the identification and naming of some of the specimens.

Mr. and Mrs. H. McArthur, for giving kind permission to camp on their properties and for the assistance which they gave us during this time.

Mr. P. A. Rawlinson, for helping with the identification and naming of some of the difficult specimens.

Mr. J. Coventry of the National Museum, Melbourne, for suggesting methods of finding certain species and without whose help this list may well have been shorter.

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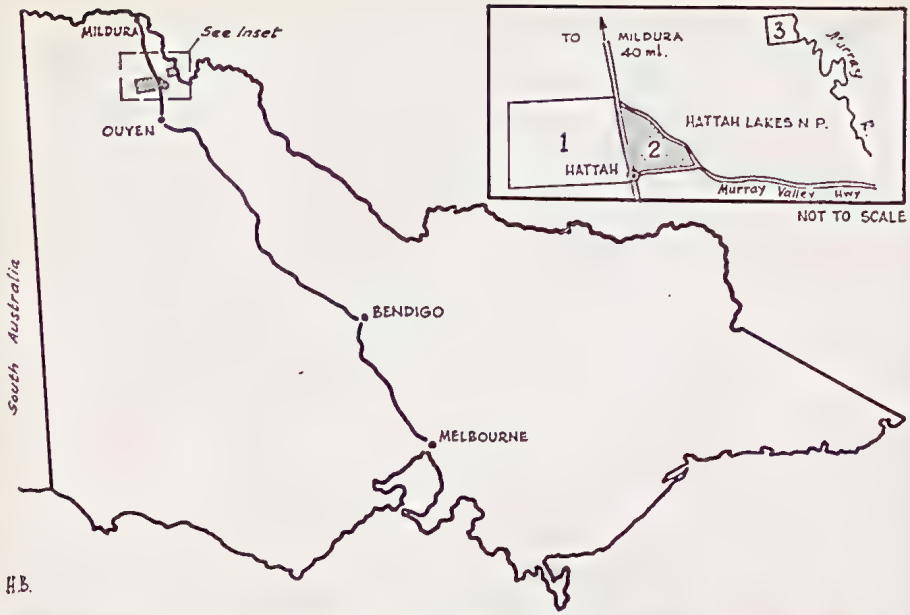

Figure 1. Map showing areas 1, 2, 3.

Plate 1.
Dragon: *Physignathus gilberti.*

Plate 2. Gecko: *Diplodactylus damaeus.*
Plate 3. Dragon: *Amphibolurus fordi.*
Plate 4. Gecko: *Diplodactylus strophurus intermedius.*
Plate 5. Blind-Snake: *Typhlops australis.*

A Diuris Hybrid from the Melbourne Area

by

P. Uhlherr

A hybrid of *Diuris* — probably *D. longifolia* x *D. pedunculata* — was discovered by Mr. and Mrs. D. Dunn in the late Spring of 1967. It was found again in 1968 and 1969 in three separate localities of the Dandenong Ranges and the Mornington Peninsula. The author was able to study plants in the field in two of these localities during 1968 and 1969. The flowers do not conform to any species known to the author. The conclusion that a hybrid is involved is by no means certain and is based on floral characteristics and on the abundance of the two assumed parents in all the localities and the relative scarcity of the plant under discussion. Usually about 3 to 6 plants have been found in clusters among a large number of *D. longifolia.* In one area, three such clusters were found. The *D. pedunculata* was normally some hundreds of feet removed. This could possibly indicate that the latter species is the pollen donor while the former is the recipient.

The flowers of the hybrid are among the most impressive of the genus, the spreading habit of the petals giving the flowers a very large appearance. The floral characteristics are more or less intermediate between those of the supposed parents, as can be seen from Figure 1. Some variability has been observed, but not more than in *D. pedunculata* itself.

The labellum has two rather obscure basal ridges, which are slightly pubescent or glandular (to a lesser degree than in *D. pedunculata*), as shown in Figure 2, K and L. The side lobes have irregular margins as in *D. pedunculata,* but the ratio of their length to that of the mid-lobe is much greater than is that species and agrees more nearly with the ratio found in *D. longifolia.* (Figure 1; D, E, F). The mid-lobe may be entire except for a small notch in the tip — less pronounced than in *D. longifolia* — or it may be rather irregular near its apex. This last feature is not found in either parent.

The petals are longer than in either parent, and the ratio of claw length to lamina length is very similar to that found in *D. pedunculata* (1/4 to 1/5), being somewhat less than in *D. longifolia* (1/2 to 1/3) (Figure 1: G. H. J.). The petals are almost horizontally spreading as in *D. pedunculata.* However, they do not point forwards as in that species, but rather are slightly recurved towards the ovary (Figure 1: A, B, C).

The lateral sepals are 1½ to 2 times as long as those of either parent and are not at all petaloid. They have inrolled margins and terminate in fine points (Figure 2; M, N, O). The dorsal sepal resembles that of *D. pedunculata* in shape, but is somewhat wider and longer. It is reflexed away from the column to a greater extent than in that species. The margins near the apex may be irregularly toothed or entire, and the tip is apiculate (Figure 1; G, H, J).

The column of the hybrid resembles that of *D. longifolia* in that the wings and the anther both exceed

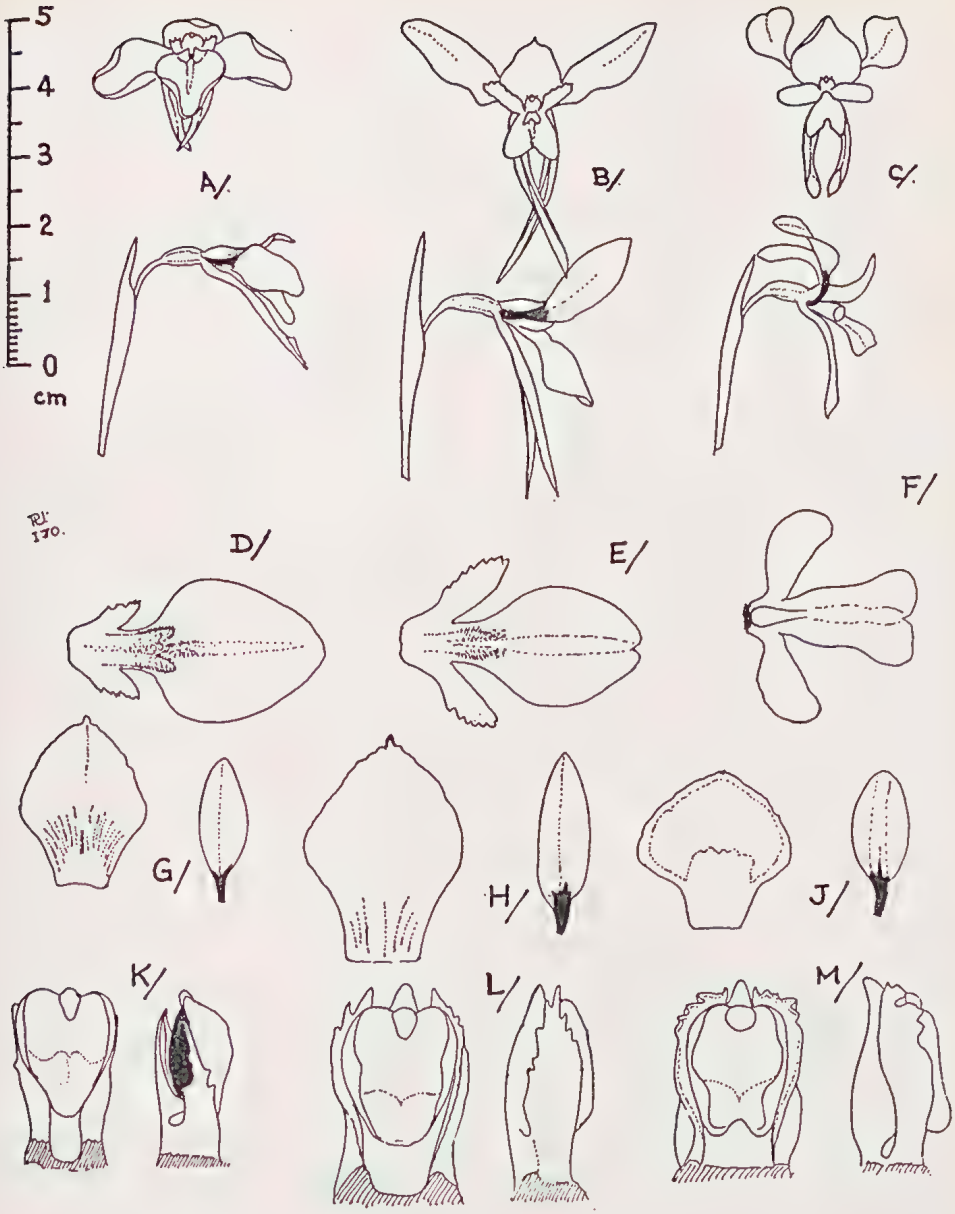

Figure 1

	D. pedunculata (left)	Hybrid (centre)	D. longifolia (right)
flower front and side (X1)	A	B	C
labellum flattened (X2)	D	E	F
dorsal sepal flattened (X2) petal flattened (X1)	G	H	J
column front and side (X6)	K	L	M.

the rostellum in height, whereas in *D. pedunculata* both wings and anther are lower than the rostellum. However, the stigma shape is closer to that of *D. pedunculata* in that the protruding swellings at the base are lacking (Figure 1; K, L, M). The shape of the anther differs from that of both parents and is rather narrower (Figure 2; A, B, C). The pollinia, with viscidia, of the two parent species are shown in Figure 2; D, G and F, J. The pollinia of the hybrid could not be removed from the anther cap, which was rolled quite tightly around the very fragile, mealy pollen masses. The pollen was, however, easily separated from the viscid disc. This seems to indicate that perhaps the hybrid is incapable of pollination except with pollen from the parent species. The pollen of hybrid flowers certainly cannot be removed by an insect. The stigma, however, appears to be quite normal, in that it is viscid and has a tube to the ovary, which contains apparently normal ovules. The hybrid pollen masses, enclosed in the anther cap, are shown in Figure 2; E and H.

The flower colour is yellow with a few rather pale, reddish-brown streaks or blotches. The dorsal sepal is streaked near its base, while the petals have broad but pale central streaks. The labellum mid-lobe is blotched, while the side lobes are streaked. The lateral sepals are wholly green.

Some plants were seen with flowers having a diameter of 55 mm. —considerably larger than either parent; however, most flowers measured about 40 mm. Plant height and robustness are as for *D. longifolia*. Also the underground organs resemble those of *D. longifolia*, which has a number of long, thick and fleshly roots radiating from the base of the stem. The point of attachment is constricted and extremely fragile. The rather large, more or less globular tubers of *D. pedunculata* are absent. Instead, the greatly elongated tubers are almost horizontally disposed (Figure 2; P, Q).

The flowering period is mid-October to early November.

Plate 1.

Diuris hybrid, centre; with *D. pedunculata*, left; and *D. longifolia* right.

interior of the pseudopodetia, hyphae hyaline 10 μ diam.: *Fertile pseudopodetia* similar.

Apothecia terminal on the upper branches of the fertile pseudopodetia, lecideine, 0.2-0.7 mm. diam.: *Disk* slightly concave to flat becoming strongly convex on maturity, dull reddish-brown to blackish: *Margin* slightly raised at first, disappearing: *Lower cortex* concolourous with the thallus: *Hypothecium* hyaline, obconical: *Hymenium* 50-80 μ tall, pale brownish: *Paraphyses* 1-1.5 μ diam., apical cell expanded: *Asci* 48 x 12 μ: *Ascospores* 15 x 3 μ: Pycnidia terminal on the smaller branches of pseudopodetia ellipsoidal 150 x 85 μ: *Pycnidiospores* hyaline 5 x 1 μ curved.

This name has been taken from an abbreviated Greek epithet, used by Rev. F. R. M. Wilson for one of his specimens and meaning "ever living coral".

Cladia ferdinandii (Mull. Arg.) R. Filson comb. nov.

Cladonia Ferdinandii Mull. Arg. in Flora 1882: p. 293.
Clathrina Ferdinandii (Mull. Arg.) Mull. Arg. in Flora 1883: p. 80.
Cladonia retipora var. *Ferdinandii* (Mull. Arg.) Wainio Acta Societatas pro Fauna et Flora Fennica IV: 234 (1887).

Cladia fuliginosa R. Filson sp. nov. ad *C. retiporam* proxime accedens differt sic: pseudopodetiis gracilioribus, colore fusco, et praecipue medulla fuliginosa.

HOLOTYPUS — Western side of Mount Campbell, Cradle Mountain-Lake St. Clair National Park, Tasmania *Rex Filson 10854* 1.3.1968 (MEL 1001725).

Thallus fruticose, composed of pseudopodetia up to 7 cm. high in scattered clumps, green becoming brownish to black, smaller parts within the clump green with orange-brown tips: *Sterile pseudopodetia* rigid, horny, up to 2 mm. diam., irregularly branched, walls irregularly perforate, perforations broadly elliptic to round irregularly spaced: *Cortex* up to 80 μ thick: *Algal layer* discontinued 40-60 μ thick, cells up to 12 μ diam.: *Medulla* loosely woven filling the majority of the hollow interior of the pseudopodetia, hyphae hyaline just under the algal layer becoming brownish to black in the centre, 8-10 μ diam.: *Fertile pseudopodetia* similar.

Apothecia terminal on the upper branches of the fertile pseudopodetia, lecideine, 0.3-0.5 mm. diam.: *Disk* slightly concave to flat, reddish-brown to dark brown: *Margin* slightly raised persistant: *Lower cortex* concolorous with the thallus. Asci and spores not seen.

Hypogymnia billardieri (Mont.) R. Filson comb. nov.

Cetraria Billardieri Mont., Syllog Gener at Spec. Cryptog., 322 (1856).
Parmelia conferta Tayl. ex Hook, Lond. Journ. of Bot., *6*: 164 (1847) —*non Duby*.
Parmelia Billardieri (Mont.) Zahlbr. Cat. Lich. Univ., *6*: 26 (1930).

Hypogymnia subobscura (Vain) R. Filson comb. nov.

Parmelia subobscura Vain in Arkiv for Botan. *8:* 33 (1909).

Hypogymnia subphysodes (Krplhbr.) R. Filson comb. nov.

Parmelia subphysodes Krplhbr. in Verhandl. zool-bot. Gesellsch. Wien *30:* 338 (1880).

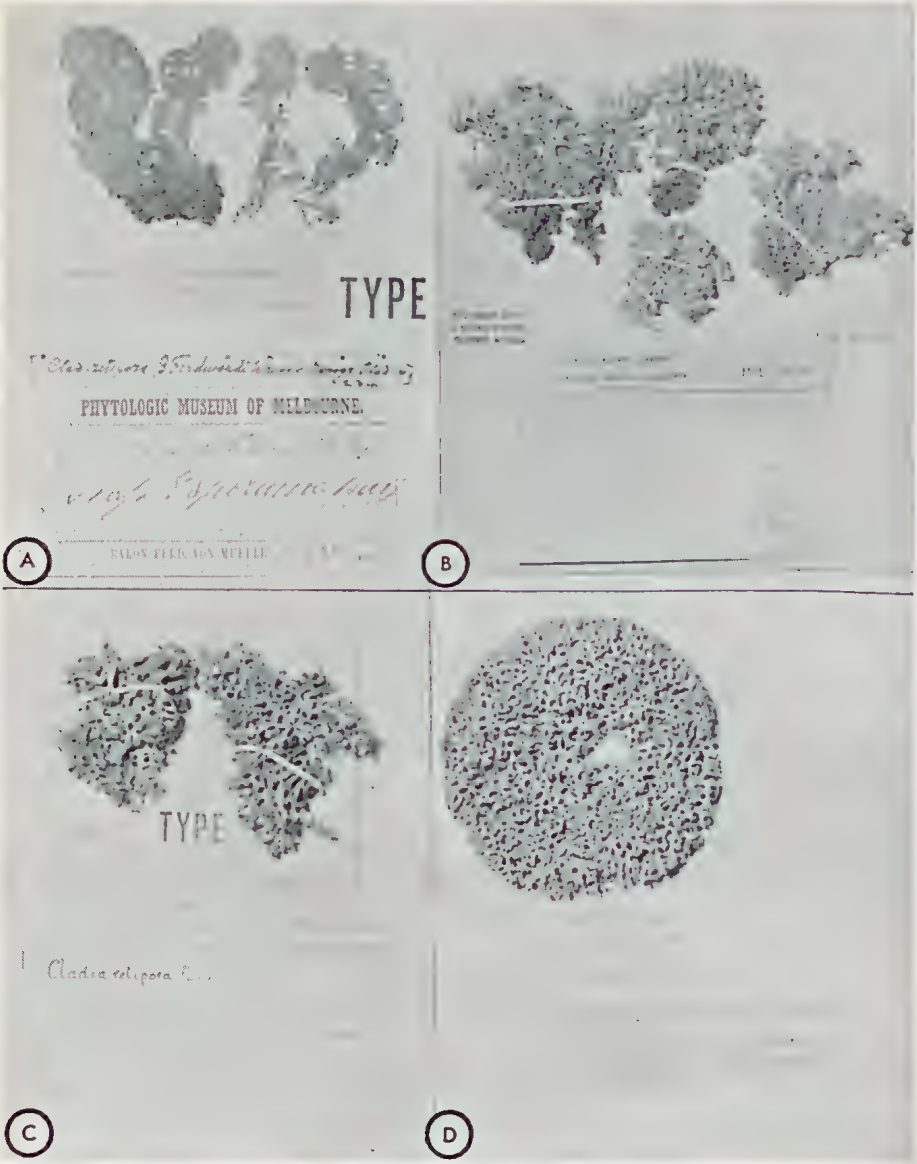

PLATE 1.

A. Type of *Cladonia Ferdinandii* Müll. Arg. Collected near Esperance Bay, Western Australia by Andrew Dempster.

B. Typical specimen of *Cladia ferdinandii* (Müll. Arg.) comb. nov. Collected at Aldinga Scrub, South Australia by R. W. Rogers 1171.

C. Type of *Cladia corallaizon* sp. nov. Collected 28 miles north of Ardlethan, New South Wales by Rex Filson 5466.

D. Typical rosette form of *Cladia corallaizon* sp. nov. Collected at The Rock, New South Wales by J. H. Willis.

PLATE 2.

A. Type of *Cladia fuliginosa* sp. nov. Collected on Mount Campbell, Tasmania by Rex Filson 10854.

B. *Hypogymnia billardieri* (Mont.) comb. nov.

C. *Hypogymnia subobscura* (Vain) comb. nov.

D. *Hypogymnia subphysodes* (Krplhbr.) comb. nov.

Unique Perfume *Prasophyllum fimbriatum* R Br

by David L. Jones

One sunny day in March 1970 I noticed a very pleasant perfume as I entered my glasshouse. The perfume was quite strong and was easily traced to its source — a potfull of flowering plants of *Prasophyllum fimbriatum*. At a close distance the perfume was almost overpowering but still very pleasant. It was easily identifiable as lemon, being identical with the aroma from crushed leaves of Lemon-scented Gum (*Eucalyptus citriodora*) and Lemon-scented Verbena (*Verbena citriodora*).

As far as I know this perfume is unique to Australian orchids. Mr. J. H. Willis, whose olfactory powers are well known, has only noticed a faint lemon scent in *Prasophyllum odoratum*. He indicated to me that the strong lemon scent was due to the aldehydes citral and citronellal.

Perfumes are well known in the genus *Prasophyllum*, section *Euprasophyllum;* but have not been reported previously in the section *Micranthum*, although I believe *Prasophyllum striatum* to have a rather obnoxious odour. There is little doubt that the perfume is an aid to pollination and the unique nature of the odour suggests some specific insect is involved. Workers in the Sydney area should keep a watch out for this.

While the spikes were at their best I carried out a couple of small experiments to learn a bit more about the species.

In the first experiment my wife and I observed the effect of temperature on strength of the odour. It first became apparent at about 65°F and increased in intensity until at 75°F it was very strong. Once again the release of the perfume probably coincides with the increased activity of insects at higher temperature.

The second experiment was to see if the responsible insect was active in my area at this time of the year, and conversely to see if the insects which pollinate *Prasophyllum morrisii, P. archeri,* and *P. despectans* are effective on *P. fimbriatum*. These insects are quite common here as all three orchid species occur naturally in the area.

I placed all of the pigmy *Prasophyllums* I had in flower in the backyard under a patch of gums. These included *P. morrisii, P. despectans, P. nublingii, P. fusco-viride* and *P. fimbriatum*. It was a perfect autumn day with only a light breeze and a temperature of 72°F. The lemon fragrance on the *Prasophyllum fimbriatum* was very noticeable.

The small flies were seen on all species except *P. nublingii*, but pollinia removal was only seen on *P. morrisii*. Whilst the flies visited the *P. fimbriatum*, they did not seem to be specifically attracted to it, nor did they appear to know what to do once on the spike. They seemed content to simply sit on the stem or ovary. None was seen on the labellum and none was seen to enter the flower to seek nectar. They also seemed uninterested in *P. fusco-viride*, while *P. nublingii* was ignored completely. On the other hand both *P. morrisii* and *P. despectans* were worked actively. Among other things, these results tend to indicate that the species has a rather specialized pollination relationship, which is probably related to its unique odour.

The First Golden Year at Longmeadow

by Victor Jacobs

Whenever the conversation turns to wattles it is not long before someone says, "Did you know that it is possible to have a wattle flowering every day of the year?" My usual answer was "Is it?", or "Have you seen it?"

They usually had not.

From the comments on the flowering seasons of the different acacias in various areas, it seemed highly likely that it was a feasible idea; and what better place to have it happen than in one's own garden. At this point I made a long range aim at Longmeadow to grow as many Victorian wattles as I could obtain, assuming that they would be suited to the habitat. At the time of writing this, in February 1970, the score is 48. This does not include certain species which lost their labels before I memorised their names, or which became muddled in the seed bed.

I began to keep records on 19 December, 1968, and one year later to the day, was able to congratulate the wattles on not missing one day of flowering. Admittedly, on some days, I had to fossick to be able to catch that golden bloom, and some of the young plants that flowered for the first time had as few as three flowers or bloomed for minute periods; but flower they did, and their immature performance holds great promise for future years. At other times the massed displays of gold, cream, or yellow, and the perfumed air were wondrous.

Figure 1 indicates the flowering species with their period of flowering. The order used is that employed by Fred Rogers in his Field Guide to Victorian Wattles. If any reader has seeds or young plants of the missing Victorian species or sub-species or knows where to obtain either, the author would be delighted to receive this information. Appendix 2 lists the non-Victorian species growing in the garden. The un-named species numbered 7.

Failures:

Acacia enterocarpa which succumbed after being accidentally damaged, cannot be included, but *A. gracilifolia* gradually died back after flowering, until it was dead. The site may not have suited it, and I will try again. Queensland Silver or Mount Morgan Wattle (*A. podalyriaefolia*) is alive, but not growing evenly or well.

Of the wattles that flowered(*) *A. retinodes* was a very narrow leaved form; (**) *A. undulifolia* only had a half dozen heads; (***) *A. brachybotrya,* while four feet high had only three flowering heads, and (++) *A. aculeatissima* had the same.

(+) *Acacia pycnantha* has been left until last of the marked species as it is rather special. In the depths of winter when very little else was flowering the fragrant perfume was evident from all parts of the garden, and attracted one to view the massed pale display of this especially early-flowering wattle.

Is it really *Acacia pycnantha*? Or does it deserve to be given some other name? Compare the two phyllodes in Plate 1. Add to this the fact

that this plant and its descendants flower not occasionally early, but consistently so, and very much earlier than the normal *A. pycnantha.* So that if we do not have a new species here, we do certainly have one that merits a place in the garden. To that end you may obtain seed from me for the cost of a stamped envelope.

Mr. G. W. Althofer, of Nindethana, Dripstone, N.S.W., has a similar early-flowering "Golden Wattle" in his lovely native garden, and this was grown from seed collected near Dimboola. Mr. Court of the National Herbarium while not advancing it to a new specific status, has informed me that a similar group of plants exist near to Serviceton.

Appendix 1. Victorian Wattles at Longmeadow (not already mentioned).

A. botrycephala	A. dealbata.	A. decurrens.	A. oxycedrus
A. doratoxylon.	A. aneura.	A. acinacea.	A. lineata. (S)
A. flexifolia	A. leprosa. (B)	A. calamifolia.	A. brownii.
A. buxifolia.	A. myrtifolia. (B)	A. rubida.	A. hakeoides.
A. penninervis.	A. salicina.	A. victoriae.	A. vestita.
A. rigens. (S)	A. howittii	A. verniciflua (B)	A. implexa.
A. melanoxylon.	A. subporosa.	A. lanigera. (S)	A. pendula.
A. trineura.	A. dawsonii.	A. continua.	

Appendix 2. Other wattles growing but not Victorian species.

Acacia baileyana—var. purpurea.		A. becklerii (S)	A. brachyphylla.
A. cardiophylla.	A. cultriformis.	A. cuneata.	A. cupularis.
A. decora.	A. drummondii	A. elata.	A. ericifolia.
A. gonophylla.	A. iteaphylla.	A. jonesii.	A. lasiocalyx.
A. podalyriaefolia	A. pratervisa.	A. prominens.	A. pubescens. (S)
A. pruinosa.	A. pulchella.	A. saligna.	A. spectabilis.

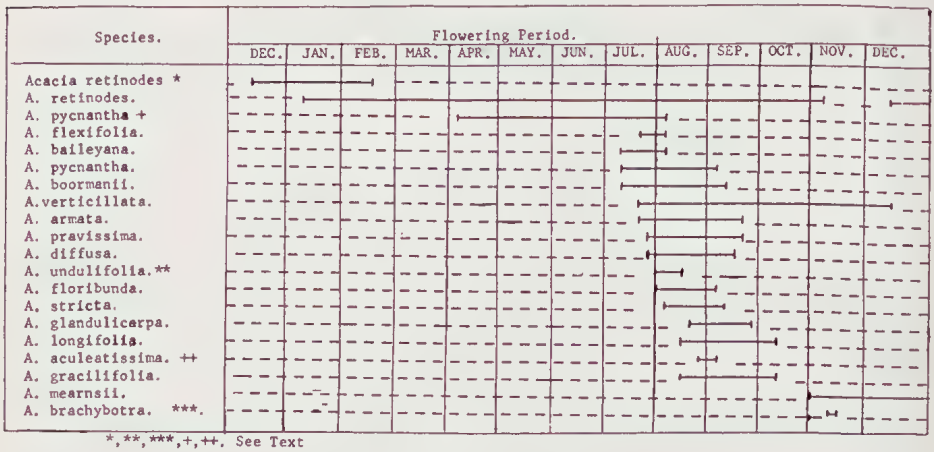

Fig. 1

The order of listing follows that used by F. J. Rogers in his **Field Guide to Victorian Wattles.** If any reader has seeds or young plants of those Victorian species not included in Appendix 1, or who knows where to obtain them, the author would be delighted to receive any information.

Plate 1

A—Phyllode of early-flowering species.

B—Phyllode of *A-pycnantha*

Plate 2

Acacia boormannii

Plate 3

Early flowering species of *Acacia ? pycnantha.*

book reviews

AUSTRALIAN NATIVE GARDENS AND BIRDS

by

BARBARA SALTER

Jacaranda Pocket Guide Series. Milton, Jacaranda Press Pty. Ltd., 1969. Size 4" x 5¼". Price $1.95.

Each year as more and more of the Australian bush is cleared, one wonders when the scourge of the bulldozer is going to end—before we have denuded the whole country? As the land is cleared the habitat of the wildlife is destroyed.

What can be done for conservation? The fight for National Parks and wildlife often seems hopeless. A positive action is the planting of native trees and shrubs in order to encourage the indigenous birds to the garden. A few well chosen nectar producing plants will soon attract the honeyeaters.

Many members will have visited Barbara and Arthur Salter's beautiful garden at Blackrock, and been amazed at the large number of birds that visit them. During the years 1954-68, 120 species of native birds were recorded in or over the garden.

In this book Mrs. Salter describes how to plan and establish a garden that will quickly attract the birds. She gives hints on the propagation of plants, and brief notes for the trees and shrubs which produce the best results. Other methods of attracting birds, such as nectar feeders (a nectar recipe is included) food to be provided, and bird baths, are described.

The use of pesticides is becoming more common and widespread so that the warning and list of dangers of these chemicals to native birds is a timely inclusion in the book.

The second part of the book introduces some of the birds that have or still do frequent the Salter's garden. We thought that some of the facts were over stated, and find it hard to believe that the same pair of Blue Wrens lived in the garden for five years.

This is an interesting little book, illustrated by clear, attractive photographs taken by Arthur Salter. Perhaps we all could donate a copy to our local Superintendent of Parks and Gardens to induce him to plant more native trees and shrubs in our suburbs so that everyone will be able to enjoy our native birds.

SUE FILSON.

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V Treasurer, Mr. D. McInnes.

A PICTORIAL ENCYCLOPAEDIA OF AUSTRALIAN WILDLIFE

by

HARRY AND CLAUDY FRAUCA

Periwinkle Colour Series. Melbourne, Lansdowne Press, 1970. Price $1.50. Size 7¼" x 5".

From Lansdowne come another two books in the Periwinkle Colour Series, bringing the total number of these excellent small handbooks to twenty.

The Pictorial Encyclopaedia is as its name implies, a collection of photographs with brief descriptions of a good cross section of Australian wildlife. The contents are divided into two parts; the first *invertebrates,* includes the following groups — coelenterates, molluscs, insects, spiders, etc. Part two the *vertebrates* includes fishes, reptiles, birds, mammals, marsupials, etc. There is a list of further reading and the names and addresses of some scientific and natural history societies in Australia. A separate index to scientific and common names is included. This is a very useful book for beginners because it illustrates names so often encountered in articles on natural history.

GOLD PROSPECTING

by

DERRICK AND DOUG. STONE

Periwinkle Colour Series. Melbourne, Lansdowne Press, 1970. Price $1.50. Size 7¼" x 5".

Gold prospecting is an absorbing, and sometimes profitable, past-time. Gold has played a prominent part in the history of Australia, although the earliest record of its discovery is 1823 it was not until 1851 that gold fever seized the country. Today there are only a few mines being worked on a full-time basis, but the number of amateur prospectors has greatly increased.

With this book the task of searching for gold should be simplified. The authors explain how to easily identify gold, the forms in which it occurs, the deposition, and the type of country in which it is found, and most important — how to work alluvial deposits. The greater part of the book contains locations and descriptions of the alluvial gold fields in each State of Australia, illustrated by coloured geological maps. The diagrams are clear, the text simple and easy to understand, with a comprehensive glossary of geological terms, but a very incomplete list of further reading.

REX AND SUE FILSON.

Botany Group

Week-end Excursion

Brilliant sunshine on Saturday and Sunday, 9 and 10 October, allowed the eight members who undertook this excursion to enjoy a superb display of springtime wildflowers, (especially the Sun-orchids), and the mild temperatures made for pleasant walking so that we were able to visit forest areas, fern gullies and hill tops where the bird calls and sightings turned the weekend into one with interests about equally divided between botany and bird observing.

The first day was chiefly occupied with the exploration of the recently declared Angahook Forest Park of 7,200 acres north-west of Airey's Inlet. Its eastern boundary is formed by the Distillery Creek which joins the Painkalac Creek to enter the ocean at the Inlet.

Our Forest Commission maps, which we obtained from the local store, stated that

> . . . the "Eastern View Coal Measures are the predominant geological feature of the park. They comprise gravel, sand, clay and brown coal deposits laid down in the early Tertiary period. Most other Tertiary deposits in the Otways were deposited towards the close of the era . . .
>
> Small areas of Quaternary (recent) origin comprising fluviatile and swamp deposits of silt and gravel are found along Salt and Distillery Creeks."

We had our lunch near a quarry in a pleasant, Red ironbark (*E. sideroxylon*) forest, and then wandered through some heathlands where wild flowers were brilliant. The ground was dotted with Blue-stars (*Chamaescilla corymbosa*) and Yellow-stars (*Hypoxis*), and there were numerous species of Bush-pea, including the Showy-Parrot Pea (*Dillwynia sericea*), the Large-leaf (*Pultenaea daphnoides*), and the Dwarf Bush Pea (*Pultenaea humilis*). Clumps of white Paper Sunray (*Helipterum* sp.) were in some areas, the most showy flowers. There were several varieties of Rice Flower, the Creamy Nodding (*Pimelea octophylla*) being particularly fine; and growing close to the gold of the Leafless Globe Pea (*Sphaerolobium vimineum*) was the orange Dwarf Wedge Pea (*Gomphol obium minus*) and various *Hibbertia* sp. and Goodenias. These colours were offset by the lavender of the Chocolate Lily (*Dichopogon strictus*) and the blue of clumps of Love Creeper (*Comesperma volubile*).

The Shining Peppermint (*E. nitida*) was the dominant Eucalypt here, but there were forests of Brown Stringybark (*E. baxteri*) and rather stunted Messmate (*E. obliqua*).

In the melaleuca swamp and gully along Distillery Creek there were many ferns, including the Rough Tree-fern, Common Maiden Hair Fern, Common Shield Fern, King Fern and large clumps of Scrambling Coral Fern, as well as the Small leafed Pomaderris (*P. elacophylla*) and Musk Daisy Bush (*Olearia argophylla*). There were clumps of Thatch Saw-Sedge (*Gahnia radula*) and quite tall specimens of the Snow Daisy Bush (*Olearia lirata*) covered

with flowers, as well as Dusty Miller (*Spyridium parvifolium*). In some areas the yellows of the Prickly-Moses (*Acacia verticillata*) and the Varnish Wattle (*Acacia verniciflua*) lined the walking tracks; and the mosquitoes were particularly numerous and vicious in these breeze-free groves!

One wallaby was sighted and the skeleton of another found by the track. We failed to reach the Currawong Falls, but certainly heard and saw many Pied Currawongs. In one area of the forest we heard singing simultaneously — two pallid cuckoos, a fantail cuckoo, and a grey thrush.

Sunday was predominantly an orchid day when we began by exploring the hills behind the Anglesea village where we found stands of the Tall Leek Orchid (*Prasophyllum elatum*) and the magnificent fully-opened dark-blue Sun Orchid (*Thelymitra grandiflora*) as well as the spotted variety (*T. ixiodes*), the Yellow (*T. flexuosa*), and the salmon (*T. rubra*). Here we also saw good specimens of Spider Orchids (*Caladenia patersonii, C. dilatata* with the green comb, *C. tesselata, C. reticulata* and *C. clavigera* (the Plain Lip Spider). These orchids grew in heathy country where the Isopogon was in flower, and where there were small bushes of *Banksia integrifolia*, and some Grass Trees (*Xanthorrhoea minor*) with flowering spikes, and areas of Running Postman (*Kennedya prostrata*).

Later, we drove to Mogg's Creek and climbed the Ironstone Ridge immediately east of the creek. On the summit, under some Brown Stringy Bark trees, we found a patch of Mosquito Orchids (*Acianthus reniformis*) with the flowers mostly dead, and several stands of Nodding Greenhood (*Pterostylus nutans, P. longifolia* and *P. barbata*). There were many bright clumps of Rabbit Ears (*Thelymitra antennifera*) and Wallflower Orchids (*Diuris longifolia*), including some pure yellow specimens. A few samples of *Glossodia major* were found, and one specimen only of a deep red Sun Orchid (*T. macmillanii?*).

In the gully further up Mogg's Creek were stands of Victorian Blue Gum (*E. globulus*) in flower, and some tall Grey Gums (*E. cypellocarpa*). This area proved to be the honey-eaters' paradise — we identified the White Eared, the Crescent, the Yellow-Winged, the Tawny-Crowned and the Brown-Headed, as well as Yellow and Scarlet Robins; Satin Fly Catcher; Rufous and Golden Whistlers; Pardalotes; Gray Fantail; White-Throated Tree Creeper, and some Red Wattle Birds.

Miss Joan Forster and Dr. Anita Rodgers made their holiday houses on the Old Coach Road available to us for cups of tea and meals, and near here we heard the Rufous Bristle Bird (which we had seen running along the road at Point Addis on the way down). We also saw an elegant pair of King Parrots and some Eastern Rosellas.

At the Allan Noble Reserve at Airey's Inlet there were some Water Hens and a couple of Mountain Duck, which we could see from our cars on the way home on Sunday afternoon.

The weekend was notable more for the variety of species and the abundance of flora, rather than for any rarities or discoveries. The two days seemed so filled with interest that it seemed to us that we had been away about a week, not just two days.

ELIZABETH TURNER.

Field Naturalists Club of Victoria

The members of the Field Naturalists Club of Victoria express their heartfelt sympathy to the husband and two young daughters of Mrs. Nancy Lewis, our Subscription Secretary. Mrs. Lewis, at the age of 36, suffered a severe brain haemorrhage on 14 October, and died on 20 October.

General Meeting

12 October, 1970

Prior to the opening of the General Meeting, an Extraordinary General Meeting was held at which a motion was put and passed unanimously approving the admittance of the Wytchitella Forest Protection League as an affiliated body with the FNCV.

Approximately 70 members were present at the General Meeting which was chaired by the President, Mr. T. Sault.

The Secretary called on members to speak about their exhibits and commented that a greater use could be made of the exhibit tables and the microscopes.

Exhibits:

A. J. Swaby—A new Grevillea found in the Glen Wills district. A specimen of the bell-fruited mallee (*Eucalyptus preissiana*).

T. Sault—Crusader Bug (*Mictis profana*) and a "Woolly Bear" Caterpillar, a moth larva.

Mrs. G. Taylor—A spike-flowered Acacia (to be identified).

Shown under microscopes —

Mrs. P. Matches—Fern prothalli of the Soft Tree Fern (*Dicksonia antarctica*).

K. Strong—Foot of Bee enlarged 130 times.

D. McInnes—Pond life from Coolart Lake (Rotifers).

Mr. D. Lee displayed a specimen of the introduced pest "boneseed" (*Chrysanthemoides monilifera*) and remarked that it was spreading in the Fern Tree Gully area near the National Park. Other members had noted it at Blackburn Lake and in some private gardens.

Also tabled were Christmas cards from the National Trust Newsletter and the Natural History Medallion to be presented to Miss Jean Galbraith at the November meeting.

The Secretary read letters announcing that the Mt. Macedon Society planned to conduct a Koala Survey in their district on 22 or 29 November, the date to be decided, and members with their own transport interested in taking part should contact Mr. Lee.

The Bendigo F.N.C. in conjunction with the Bendigo J.C.'s would be holding an all-day seminar in the near future to discuss the establishment of a series of National Parks within a radius of 50 miles of their area.

The Forests Commission in conjunction with the Monash University Dept. of Zoology and Comparative Physiology would conduct a seminar on Fire Ecology at the Zoology Dept. on 28 November.

A letter was received from an interested person questioning the right of an American Paleontology Expedition to remove fossils from Lake Callabonna, S.A. for shipment to the U.S. Inquiries about this matter elicited the reply that because there were not enough qualified persons in this country to do this work, and as the Americans were world leaders in this field, it was considered that they should be allowed to carry out this important study. The U.S. experts were lent to the South Australian University to assist with the project.

It was intended to publish a locality index of the *Victorian Naturalist* from 1884-1969, compiled by Mr. Saunders of the National Parks Authority. Members agreed that it should be published and a motion was passed to this effect.

The President announced that the exhibit at the "Preparation for Retirement" show held at the Chadstone Centre had been a success due to the efforts of Mr. and Mrs. Strong.

Resignations from the positions of Vice-President and Councillor had been received from Mr. and Mrs. Strong. The Vice-Presidency had been under-

taken by Mr. J. Willis and that of Councillor, by Mr. R. Riordon, leaving one vacancy on Council yet to be filled.

Mr. T. Sault asked if any members had information regarding a proposed new road by the Country Roads Board at Turton's Track in the Otway Ranges.

A small dinner party in honour of Miss Jean Galbraith was to be held at the Botanical Hotel prior to the presentation of the Natural History Medallion on 29 November. Those wishing to attend should notify the Secretary.

The meeting was informed of the death of Mrs. Arthur Webb, a member of the club.

Mr. D. McInnes reported on the Nature Show and stated that attendances were down for this year. An application for the hire of the Lower Town Hall during Show Week had been made for next year.

The guest speaker for the evening was Dr. Malcolm Calder, Senior Lecturer in Botany at the University of Melbourne, whose subject was "The Role of the Naturalist in To-day's World". Dr. Calder's talk was topical and enlightening and presented a number of points very relevant to members. A report of the address will be published separately.

Botany Group Meeting

8 October, 1970

The speaker for the evening was Mr. Jim Willis. As usual, when the group has the privilege of hearing Mr. Willis, the numbers present were well above average. The talk was entitled "A Glimpse of Some Plants of New Guinea". Mr. Willis was there this year for the last week of June and all of July.

The area of New Guinea controlled by Australia is just twice the size of Victoria. In the 180 sq. miles of this part of New Guinea, including the S.E. Archipelago, the floral and animal life is incredible. The mountains are amazingly high and it is difficult to get to them. Now, there is a main highway through the mountains, but otherwise air travel is the only way of penetrating to the often incredibly steep mountainous parts.

There is a wide variation in rainfall in New Guinea, being only 39" around Port Moresby, where the dry hills bear a resemblance to parts of Central Australia. But over the backbone of the Owen Stanley Ranges, the annual rainfall is 200" and the humidity 90%. There is no twilight—sunrise at 6.30 a.m., sunset at 6.30 p.m. In the Highlands the rainfall is 100-150". Mt. Hagen has a lovely climate of 60°-70°F, rain every night, but clear, fine days except for quick thunderstorms.

There is a dense population in these parts and some of the country is incredibly steep. Over population is a great problem, with terrible unemployment and no work or opportunity for intelligent people.

The flora is unbelievably rich and varied with 2,500 known orchids, 2,000 ferns, 315 grasses, 200 rhododendrons, from tiny epiphytes to those with large flowers seven inches across. At Mt. Wilhelm there are 250 species of mosses.

The beautiful birds of paradise are hard to observe as they fly about in the high jungle canopy. However, they are tame in the Baiyer River Wild Life Sanctuary, which was an excellent place for observing the fauna. Even in the towns the butterflies were amazing in size and colour, like vivid jewels. Mr. Willis met a millipede as big as an eel and as thick as a banana, which could shoot out an acrid gas when alarmed.

Beautiful pictures of the kinds and zones of vegetation were shown, the arid coastal growth at Port Moresby, the thick jungle of Lae. Lae boasts a most interesting Botanical Garden which is wonderfully grown after only 25 years. The Wahgi Valley, between Goroka and Mt. Hagen, is composed of immensely deep, rich peat.

Mt. Hagen market was shown, teeming with people and colour and dotted with the grass rotundas of the mission stalls, a bunch of apricot-coloured bananas, native fig trees with fruits growing from the trunks, a swing bridge made of vines over a rushing river. Also seen were climbing heath, a native crimson balsam, a scarlet bramble, and a huge climbing fern. Views were also shown of the moorlands, the volcano craters and cirques of Mt. Giluwe, blue mountain gentians, scarlet lichens, white heath, and up near the tundra tops, still more orchids, a quill fern, an astelia (*A. papuana*), and a mountain ranunculus. As the top of Mt. Wilhelm was approached, many plants were similar to those found on our Australian

mountains, including plenty of *Leucopogon hookeri.*

Above 10,000 ft. all the rhododendrons were scarlet and bird-pollinated, below they were insect-pollinated and mostly in shades of yellow.

After the mountain areas, we saw the north coast, including Weewak and Madang on a peninsula, and an archipelago of islands. The houses in this low, wet part are on stilts. In the streets, the trees are covered with staghorn ferns. The Barringtonia tree bears its tassely flowers at night. These are followed by a quadrangular fruit.

Reluctantly the audience returned to reality and the walls of the lecture hall at the Herbarium, where Mr. Fairhall thanked Mr. Willis for a rare treat. Mr. Willis kindly answered numerous questions.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9 November — At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Nature Notes and Exhibits.
3. Subject for evening—Presentation of Natural History Medallion to Miss J. Galbraith by Mr. R. T. M. Pescott; and an address by Miss Galbraith on "The Joy of Living".
4. New Members.

OCTOBER

Ordinary: Mr. Donald R. Bray, 7 Pleasant Road, Thomastown, 3074.
Mr. Neil L. Murfet, 34 Malpas Street, East Preston, 3072. (Interest—Botany).
Miss M. A. Pertinac-Lauda, 1 Spencer Street, Essendon, 3040. (Interest—Geology.)

Joint Ordinary:
Mr. and Mrs. J. K. Barrows, 62 Heathwood Street, East Ringwood, 3135. (Interest—Natural History.)

Junior: Miss L. N. Heales, Tongala Road, Kyvalley, Vic. (Interest — Birds.)

Affiliated: Wychitella Forest Preservation League, c/o Secretary, Mr. R. Johnson, Wychitella, Vic.

Country: Mrs. Valma Lumsden, Synan Road. Fish Creek, 3959. (Interest—Botany, Birds and Conservation.)

NOVEMBER

Ordinary: Mr. Gary R. Barnes, Flat 6/6 Wattle Drive, Watsonia, 3087.
Mr. Edgar Brumer, 4 Sheridan Ave., Frankston, 3199.
Mr. Douglas N. Gunn, 35 Howard Ave., Mt. Waverley, 3149.
Mrs. L. M. Beard, 35 Jenkins St., Northcote, 3070. (Interest—Entomology.)
Mr. Harry M. Barnwell, 13 Seaview St., Mt. Waverley, 3149.

Joint Mrs. J. E. Excell and Richard Excell, 29 The Eyrie, Eaglemont, 3084.

5. General Business.
6. Correspondence.

Monday, 14 December—"Museology 70": The Function and Role of Museums in Society—Mr. J. McNally, Director of Natl. Museum of Victoria.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 12 November — Botany Group. Miss H. Aston will speak on Botanical Terms.

Wednesday, 18 November — Microscopical Group.

Friday, 27 November—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Wednesday, 2 December — Geology Group.

Thursday, 3 December — Mammal Survey Group meeting at Arthur Rylah Research Centre, Brown St., Heidelberg, at 8 p.m.

Friday, 4 December — Junior meeting at 8 p.m. in Rechabite Hall, 281 High Street, Preston.

Monday, 7 December — Entomology and Marine Biology Group meeting at 8 p.m. in room next to the National Museum Theatrette.

Thursday, 10 December — Botany Group: Members night.

Friday, 11 December — Montmorency and District Junior F.N.C. meeting in Scout Hall, Petrie Park at 8 p.m.

F.N.C.V. EXCURSIONS

6-8 November—Botany Group excursion to Wilson's Promontory. Details in last month's Naturalist.

Sunday, 15 November — Lorne. The coach will leave Batman Avenue at 9.30 a.m. sharp. Fare $2.00, bring two meals.

Sunday, 6 December — Ben Cairn. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.50, bring two meals.

Sunday, 13 December — Werribee Gorge. This will be a private car excursion led by the Geology Group in conjunction with the Hawthorn Juniors Club and it is hoped other club members will join in the excursion. Cars meet at 9.30 a.m. opposite the C.T.A. Building in Flinders Street or at Bacchus Marsh at 10.30 a.m. Further details can be obtained from Mr. McInnes.

Saturday, 26 December-Sunday, 3 January — Cann River. A coach has been chartered and hotel accommodation booked for this period. The coach will remain with the party for use on day trips, the fare will be approximately $24.00 (to be paid by the end of November, cheques to Excursion Trust) including day excursions and members will pay individually for accommodation which was quoted at $5.50 for dinner, bed and breakfast, lunch can be obtained for 60 cents.

GEOLOGY GROUP EXCURSIONS

Sunday, 8 November — To Kinglake. Leader: Mr. George Carlos.

Sunday, 13 December — To Ingleston with Hawthorn Juniors — along Ironbark Forest Road to Pyramid Rock overlooking Werribee Gorge. Leader: Mr. J. Myers.

Sunday, 7 February — Maribyrnong River Terraces—upstream from railway bridge, Albion-Broadmeadows Line. Leader: Mr. D. McInnes.

Sunday, 14 March — To Bulla-Deep Creek Gorge. Transport by private car. Spare seats are usually available for those without their own transport. Excursions leave from the western end of Flinders Street Station, opposite the C.T.A. Building at 9.30 a.m.

No excursion is planned for January, 1971.

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Mammal Survey: Mr. P. HOMAN, 40 Howard Street, Reservoir 3073.

Entomology and Marine Biology: Mr. J. W. H. STRONG, Flat 11, "Palm Court", 1160 Dandenong Rd., Murrumbeena 3163 (56 2271).

Geology: Mr. T. SAULT.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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Vol. 87, No. 12 December, 1970

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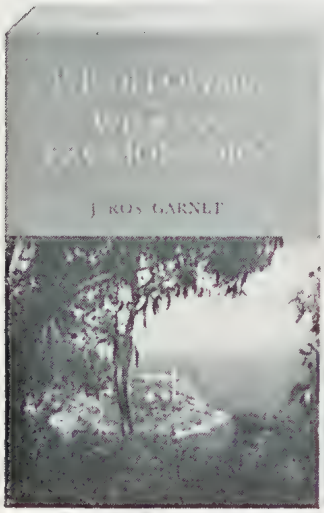

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Front Cover:

Calocephalus brownii, the "beautiful headed" bed-bush or cushion bush named after the illustrious botanist Robert Brown, who did some of his important collecting in the Kent Group. Here it is being put to good use!

Photo: Julie Marginson.

South West Island, and other investigations in the Kent Group

by

JACK JONES,* M. A. MARGINSON†
AND S. MURRAY-SMITH†

Thanks to oil and natural gas, Bass Strait is now a familiar phrase on the financial pages of our newspapers. Indeed, the States have been quarreling as to just where their previously unregarded offshore boundaries in Bass Strait lie. Accompanying this awakening of stock exchange interest in recent years has been the development of an interest in the history, geography and ecology of the scores of islands and some thousands of Australians in this region.

Until the last ten years very little systematic scientific work had been carried out in the Bass Strait islands. Individuals as well as groups of amateur naturalists occasionally made enterprising expeditions, however, and the literature, though of course discursive, is of surprising volume and goes back almost as far as the founding of Sydney Cove.[1] It is of interest that the first settlement in Australia outside the Sydney area was that of Captain Charles Bishop in Kent Bay, on Cape Barren Island, in October 1798,[2] while the fur seals which Bishop was seeking provided — together with the whales such men soon turned their attention to — probably the bulk of Australia's export income in the first forty years of this nation's existence.[3] One follows Geoffrey Blainey in wondering whether the general lack of interest in Bass Strait, which has prevailed until recently and is still apparent, is not due to the general apathy of Australians to the maritime history which has been so important to them.[4]

In contrast to the earlier period, however, in the last decade a significant beginning has been made to the scientific assessment of the region. In no small part this has been due to the establishment at Monash University, initially under Professor "Jock" Marshall, of a zoology department unfashionable enough to be unashamedly interested in Australian studies. It would be tedious to list the contributions made in recent years to the study of Bass Strait, but mention may be made in passing to Norman Tindale's remarkable paper on the Cape Barren Islanders, *Growth of a People* (*Records of the Queen Victoria Museum, Launceston*, n.s. No. 2, 1952); to Robin J. Pryor's papers on land use on Flinders Island; to the Royal Society of Victoria's publications on the amphibia (M. J. Littlejohn and A. A. Martin), reptilia (P. A. Rawlinson) and fishes (R. S. Frankenberg) of the islands; to Dom. Serventy's famous papers on the mutton-bird; to E. R. Guiler's and D. F. Dorward's work on the Cape Barren goose; to R. A. Keble's and J. N. Jennings' publications on the sunklands of Bass Strait; to R. H. Green's work on the birds of Flinders Island (1969); to R. C. Kershaw's and F. L. Sutherland's unpublished manuscript on the geological history of Flinders Island (1967); and to Jeannette Hope's synoptic study of the mammals of Bass Strait (Ph. D. thesis, Monash University, 1969). In

*26 Warleigh Rd., West Footscray.

†University of Melbourne.

the historical area N. J. B. Plomley's classic edition of the G. A. Robinson papers, *Friendly Mission* (Tasmanian Historical Research Association, 1966), is too little known, and it is understood that a professional history of King Island has recently been commissioned.

Of great promise is the rapidly developing concern of the Australian Conservation Foundation in the Bass Strait area, with an early intensive field-study of the Furneaux Group projected, and beyond that the possibility of a major, comprehensive survey of the eastern Bass Strait islands in general. It is also pleasing to record the investigation of the Hogan Group in 1968 by a properly-mounted expedition of young scientists, under the auspices of the McCoy Society of Melbourne; publication of the results is well advanced. Plans for a similar expedition to Curtis Island in 1971 are now under way.

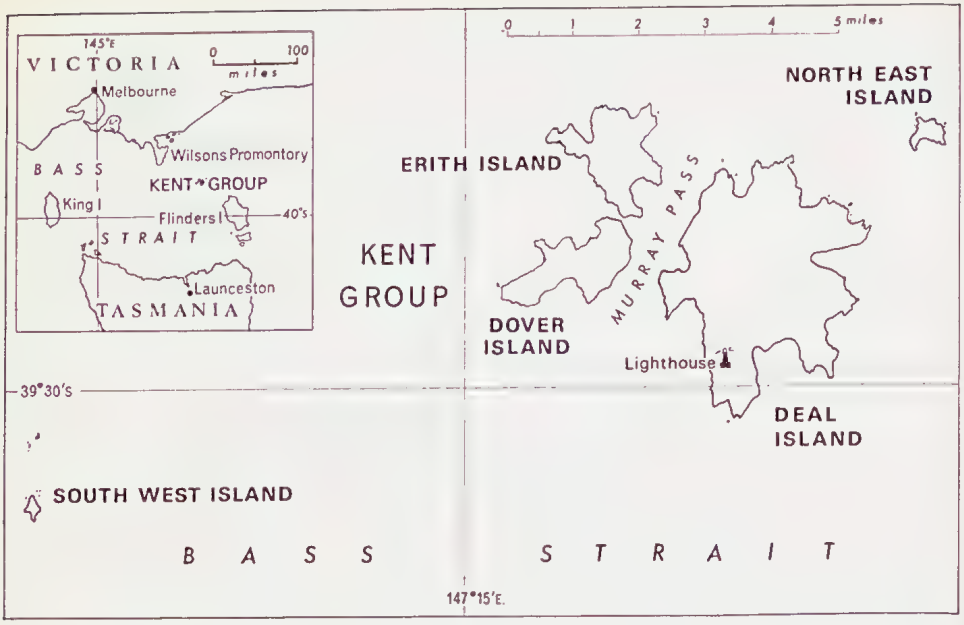
Background to the present study

For nearly ten years a party, of which the present authors are members, has been visiting the Kent Group in Bass Strait. We have been based (by courtesy of Mr. Brian Stackhouse) on Erith Island, have normally spent three to five weeks on each visit, and have attempted, within the limitations of our amateur status, to open up areas for future systematic investigation by those more qualified. Of the present authors the first is an amateur naturalist and ornithologist of long standing, the second a biochemist and the third a historian. Records of our previous expeditions and their findings, together with historical and other background for the Kent Group, will be found in previous articles in the *Victorian Naturalist* for August 1967 and September 1969.

The Kent Group lies about forty miles south-east of Wilsons Promontory and approximately equidistant between the Victorian mainland and Flinders Island. It consists of three large islands, Deal, Erith and Dover, contiguous with each other, and two smaller islands some distance away, North East and South West. Deal Island, the largest in the Group, is about 5,000 acres in extent and rises to one thousand feet. With two lighthouse families, it is the only inhabited island in the Group.

The interest of the Group resides in several factors. One is that it is not only a substantial body of land, but lies at what might be called Bass Strait's "pole of inaccessibility", thus giving it a special biological significance. Another is the range of habitat or land-use: Deal Island, continuously occupied since 1846, with only vestigial grazing now taking place on it, and with a varied cover of grassland, shrubland and woodland; Erith Island, held under a grazing lease and running some forty cattle; Dover Island, imposingly precipitous and heavily wooded, and seemingly never disturbed by the hand of man; the two smallest islands, also untouched but in this case mounting only stunted or ground-hugging vegetation. A third interest is the physical beauty, variety and grandeur of these islands.

The reason we go to the Kent Group is not primarily to undertake scientific work. It is to get away from people and the insanities of the "growth" complex ruining what we suppose has to be called "civilized" Australia; to have time to talk and drink and quarrel and to get to know even our children and our close friends better; to hear the sea and feel the wind and see the cliffs and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SOUTH WEST ISLAND
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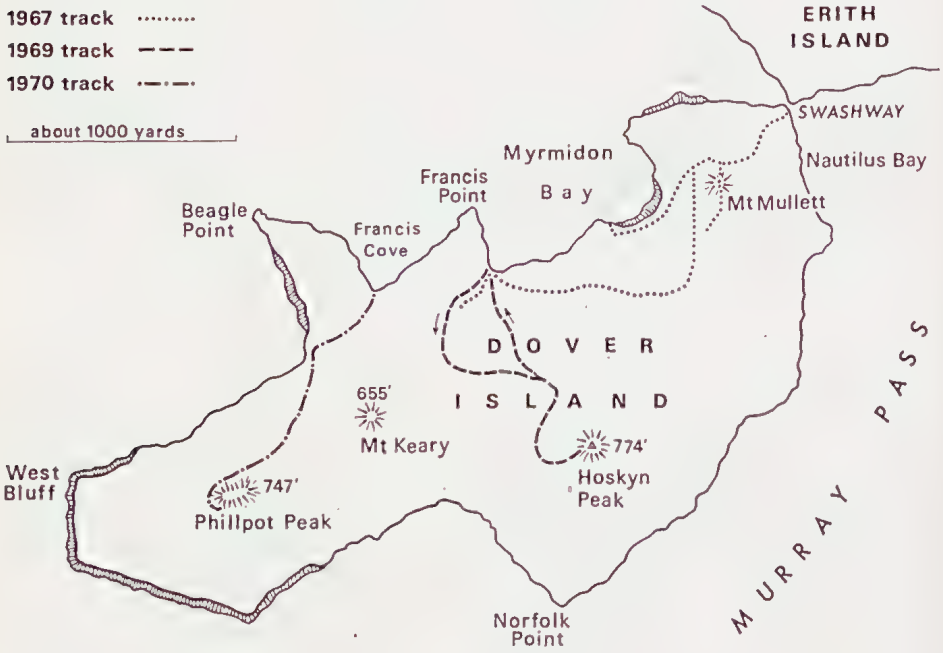
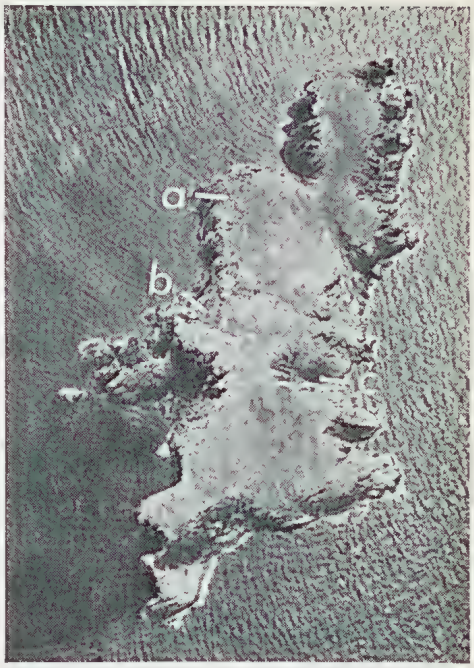

1967 track
1969 track
1970 track
about 1000 yards
ERITH ISLAND
SWASHWAY
Nautilus Bay
Myrmidon Bay
Francis Point
Mt Mullett
Beagle Point
Francis Cove
DOVER ISLAND
655'
Mt Keary
774'
Hoskyn Peak
West Bluff
747'
Phillpot Peak
MURRAY PASS
Norfolk Point

the colour of the water. But we also believe that a focus of endeavour at some point makes any undertaking more enjoyable. In our 1969-70 visit we had four major enterprises in mind: a long overdue census by a trained observer of the bird life of the islands; an attempt to take our explorations of Dover Island further by penetrating the south-western end of the island; a landing on, and survey of, South West Island, the least-visited and most remote island in the Group; and the recording of wind and weather. An account of the carrying out of these tasks follows.*

South West Island

For years we had been looking towards the fifth island of the Kent Group, South West. We had seen it in the distance from the *Marjorie Phyllis*, we had seen it glistening in the sunset as we stood on the high peaks of Deal, we had seen it closer still in climbing Phillpot Peak on Dover this year. The strange pattern of dark and light greens over the plateau top of South West had become a source of lively discussion. And we had seen the island as we bent double into the wind at One Tree Hill on Erith on the day following a storm such as we would not willingly be in again. Spray was still being hurled almost to the top of its 250 feet cliffs in a scene of such wildness that for the first time, we were forced to visualize New Zealand



South West Island, aerial photo 1964, scale 1,070 ft. to the inch. (a) Trig. point, 323 feet. (b) Tarn. (c) Landing point. The long axis of the island is close to north-south.

to the East and South America to the West as the only windbreaks at 40° South. The "wind rose" for Erith which accompanies this article shows better than words the windiness of the area; but, as the islands are protected from tourist exploitation by the winds, we have never really resented them.

South West is about seven and a half statute miles from the nearest point of the Kent Group. It has the general shape of an elongated pie, with a plateau (sloping to the east) atop 250 foot cliffs and with some undulations in the plateau leading to a rise of 323 feet above sea level. On this eminence there is a massive trig. point, visible with binoculars from Erith Island, and reputedly placed there during the Second

*We wish to acknowledge with gratitude the assistance and support of Mr. Brian Stackhouse, of Flinders Island; of Mr. Frank Goold, of Port Albert; of Mr. and Mrs. Jack Lierich, of Port Welshpool; of Mr. and Mrs. Bob McNeill and Mr. and Mrs. Clive Cocum, of Deal Island; of Captain H. M. Head, Regional Director of the Department of Shipping and Transport, Melbourne; of Dr. F. A. Berson, of the CSIRO Division of Meteorological Physics, Aspendale, Victoria; and of Comalco Industries Pty. Ltd. who, through the good offices of Mr. Dean Bunney, supplied us with an aluminium dinghy which was ideal for our purposes.

World War as a navigational aid to ships avoiding minefields off Wilson's Promontory. We were informed by Mr. Frank Goold that a couple of brief landings have been made on the island since that time by passing yachtsmen, but there is no record of this, and certainly no collections exist from South West Island.

All this then made a splendid lure, and we were able to arrange that, on 17 January, 1970, during a few hours respite from his almost unbelievably heavy schedule, Frank Goold should take a party of us there. It seemed fair weather in our sheltered cove but by the time we were well into Murray Pass it had become clear that we were heading into considerable seas. Seas "slight" to "moderate" from the south-west and rising, encountered by a 48 foot fishing boat heading south-west, is enough description for the initiated; the uninitiated are advised not to believe those words at all. We quickly found that to hang on tight enough to avoid falling over required all our strength. In the interests of science it ought to be recorded here that twenty-four hard-boiled eggs roll around the open deck of a fishing boat with great vectorial originality. As an example of human resource it ought also to be recorded that we did not lose an egg, since they were scrambled after expertly by some of the party. Others were nearly lost overboard, helpless with laughter at this grotesque egg ballet.

South West Island — the landing point with the dinghy in foreground, and *Marjorie Phyllis* at anchor. The severity of the gully slope is not evident in this photograph.

Photo: M. A. Marginson.

There seemed to be little hope of landing on South West in such conditions, but Frank Goold was of the opinion that there might prove to be a small lee under the cliffs on the north-east of the island. As we came closer, the trig. point stood out clearly and the patterns of vegetation became much more obvious—many different shades of green over the plateau, now quite clearly deriving from relatively homogeneous patches of different plants. There also appeared to be a cleft in the cliffs right ahead of us; we now seemed in these rough seas to be heading for a collision with the island. At the last moment the *Marjorie Phyllis* slid out of the waves and into the predicted lee. The cleft was now seen as a very steep gully in the centre of the calm area. We unshipped our dinghy and a landing was effected with some difficulty by an advance party on to large slippery granite boulders which were being subjected to a three foot lee swell. (Eventually the whole party managed to land, including much to our surprise the small children.)

It was an extremely exciting moment. We had landed at the foot of a gully some fifty to a hundred feet wide which rose at a severe angle for some two hundred feet as a mass of granite debris of varying sizes. The whole mass was covered with succulent plants from the high-water mark up — literally held together by the Rounded Noon-flower (*Disphyma australe*). The granite around us was of a different type to that seen on the other islands: it did not appear to be exfoliating, and contained large books of glistening mica and white and grey-green crystals.

We commenced to climb the gully with considerable caution, testing every footstep and being careful to avoid dislodging rocks on to those below. For the first hundred or so feet there was no evidence of any other vegetation but the noon-flower. At about 150 feet a large outcrop of the Tree Hollyhock (*Lavatera arborea*) was discovered growing profusely, even rankly, in the gully and up one side of it. Its very pale lilac flowers with their deep lilac stripes and its grey-green leaves formed a striking contrast to the carpet of apple-green, brown and red noon-flower leaves. The cliffs at the top of the gully now became almost sheer and the gully debouched to the right and led around to the summit plateau. In this area patches of Blue Tussock-grass (*Poa poiformis*) began to appear amidst the noon-flower, and isolated specimens of the Bulbine Lily (*Bulbine bulbosa*), the Variable Groundsel (*Senecio lautus* subsp. *dissectifolius*) and Seaberry Saltbush (*Rhagodia baccata*) were noted.

On reaching the summit it was seen that there were several elevated points in different directions, with a main eminence to the north west. It immediately became apparent that the vegetation was highly regionalized, and a careful study of the location of each species would, we are sure, prove most rewarding to a botanist.

The following notes are very rough and mostly serve to indicate the phenomenon rather than to give details of it. From our access gully we set out across the middle of the island on a carpet of noon-flower flanked by tussock grass domains. The tussock grass was honey-combed with burrows — whether of mutton bird or of penguin we were uncertain until we found a mutton bird chick and a penguin in the same area. Do the penguins inhabit the mutton bird burrows in the latter's absence? It seemed that the type of cover was related to the depth of the soil and the degree of exposure. The noon-flower grew typically on large areas of smooth granite, the tussock grass where the ground was more broken and the soil deeper.

Led across the island by the noon-flower carpet, and then through the tussock grass, we suddenly came across an outstanding feature of South West. Almost in its middle, there is a large, well-established depression, perhaps 50 feet wide by 100 feet long, in which was contained a quantity of very salty water. This was far from being a mere rock pool. It was a little lake or tarn with a bottom of fine granite and quartz pebbles, some of which had an unusual green coloration. There was a distinct shore-line and a fine pebbly strand. These pebbles in and around the tarn were composed of crushed pegmatite quartz, with some alkali feldspar and traces of mica, the green stain being possibly due to the effect of copper compounds. Large crystals of mica of a Muscovite type found elsewhere on the island, an

inch or more in length, also indicate the pegmatitic origin of the island's granite, and were also stained with a green smear typical of such an association.

The shore-line vegetation around the pool was quite consolidated, forming a distinct ledge a foot or more high which fringed the pebbly "beach". This consisted of a mass of succulents — Noon-flower, Austral Stonecrop (*Crassula sieberana*) and Beaded Glasswort (*Salicornia quinqueflora*) — with here and there a tussock of *Poa*. It was obvious that the tarn fills up periodically, since the pan was but half covered and there was a clear spillway to a great chasm nearby in the western cliff line.

On investigating this chasm, we found a carpet of noon-flower even more remarkable than the one we had climbed up. Here the plant was cascading over the cliff's edge and growing down as far as we could see on nearly sheer walls of granite. (This phenomenon was seen again on the cliffs beyond the main peak and short of the north point.) Leaving the tarn, we now climbed up to the trig. point, first through tussock grass honeycombed with burrows, and then through tumbled boulders between which grew dwarfed specimens of many of the plants with which we were familiar on the other islands—notably the Sea Box (*Alyxia buxifolia*), the Variable Groundsel, the Seaberry Saltbush and a Correa, among others. The Correa we assumed to be a white-flowering variety of our familiar *C. reflexa* var. *nummularifolia*, but specimens of it were later positively identified at the National Herbarium as *C. alba*, a species new to the records of the Kent Group. None of the familiar plants looked quite the same as we had seen them elsewhere in the Group and we were a little puzzled by them at first. None was higher than three feet and they seemed oddly different — distorted by the hard conditions.

What was familiar, however, was the presence of lichen everywhere—the typical orange lichens of these islands being seen together with yellow and green types. The trig. point (which we found to be some-

The tarn on the plateau of South West Island.

Photo:
M. A. Marginson.

what dilapidated) was covered in frilly green lichen, particularly on its lee side. (A list of eight lichens collected is given in an appendix.)

Heading now towards the north point of the island we descended from the slight elevation of the main peak, with another spectacular noon-flower chasm showing up on the west side, and so down to another carpet of succulents. This was the most extensive area of the island under succulent cover, being almost as wide as the island at this point and composed almost exclusively of Rounded Noon-flower with some lesser elements of Austral Stonecrop and Beaded Glasswort. Once again we saw no sign of the Angled Noon-flower (*Carpobrotus rossii*) — this succulent, though a minor component, was always found in the succulent areas of Erith Island. When in full bloom such a great stretch of succulents must be a rare sight.

As the ground rose again to the north point the regional nature of the other vegetation was again seen. The exposed area of granite with succulent cover gave place on the rise to what is best described as being basically an area of tussock grass. The grass itself was everywhere interlaced with a scattering of the three persistent succulent species which had been noted at the tarn, as well as the Bower Spinach (*Tetragonia implexicoma*). These species seemed to form a substratum to all the flora, sometimes in a very minor role, as here, and sometimes being quite dominant, as on the granite slopes. Large areas of the tussock grass domain, however, appeared to have been successfully invaded by other plants. In this area, the plants which had been most successful in forming colonies were the Tree Hollyhock (*Lavatera arborea*) and the Coast Saltbush (*Atriplex cinerea*). In fact, substantial areas of this northern part of the island were under a dense cover of two to three foot high bushes of these two species. This was responsible for the green patches on the north point which had been discerned from a distance.

Close by the north point, and overlooking the western side of the island, we found two rough stone shelters, adjacent to one another, made by walling in a large space under an overhanging rock.

While this investigation had been proceeding, other members of the party pursued their own interests, whether enjoying the glorious isolation of the island, observing the bird life or making more meticulous observations of smaller areas. One such point of study was the area sloping away from the lake to the south east. As on the north point, there had been seen, from a distance, prominent areas of differing greens. Set, as in the north, in a domain of bird-burrowed tussock grass with a substratum of succulents, it was found that, as the slope fell away to the cliffs, there was firstly a substantial area in which the tussock grass was replaced by bushes between one to three feet in height, composed largely of the Variable Groundsel and of the Seaberry Saltbush. As the plateau sloped away to the south, and quite suddenly, these plants were replaced by a relatively homogeneous area of Tree Hollyhock. (The vertical fall of the whole slope would have been something like fifty feet.) Scattered through these patches, but growing no more than twelve inches high, were the Bulbine Lily and the Austral Storksbill (*Pelargonium australe*). Although this is the first time we have mentioned this pelargonium, it was in fact scattered through the mixed tussock grass areas, its twisted semi-prostrate stems being something

of a feature of the ground cover. Other species collected here and there on the plateau were the Coast Peppercress (*Lepidium foliosum*) and the Tall Daisy (*Brachycome diversifolia* var. *maritima*).

As we came to leave the island we began to summarize some of the features of it which were most notable. Firstly we were struck by the differences between this island and the other islands of the Group. The very granite of the island looked (and was) different to that of the other islands. The plants grew in domains in a way which we had not seen before. Common plants, such as the Seaberry Saltbush, were existing in such hard conditions that they had grown in an unfamiliar and distorted way. Plants which were quite common on the exposed parts of the other islands (excepting North East) were not found here at all: for instance, the Oyster Bay Pine (*Callitris rhomboidea*), Grass Triggerplant (*Stylidium graminifolium*), Hop Goodenia (*Goodenia ovata*), casuarina, and most noticeably the Cushion Bush (*Calocephalus brownii*). In addition, there were several plants on this island (Coast Saltbush, Tree Hollyhock and Austral Storksbill) which we had not collected elsewhere, even on the not dissimilar North East Island, and which must be inconspicuous if they do occur elsewhere. On this island they were dominant species. All these differences gave us the impression that South West did not truly belong to the Kent Group.

The second feature which we recognized was that, even in the short time available, we had traversed the island with ease almost from end to end, leaving only the southwest point unexplored. Yet from a distance the island appears a considerable massif. The answer to the contradiction lies in the fact that, by contrast with the other islands, we were dealing with a plateau which, once attained, gave easy access to all its parts. It should be noted, however, that there were some precipitous cliffy areas we did not have time to prospect, and on which some flowering plants which interested us were to be seen.

Leaving the plateau and the island proved almost as difficult as attaining them. Descending the gully which appears the only feasible landing place on the island a large boulder was dislodged, to the peril of those below. The swell on the rocks where we had landed would have made re-embarkation most difficult, but fortunately by this time something of a natural landing stage had been discovered a few yards to the south of the gully's mouth, accessible from the land by a climb above a deep cleft in the rocks. We were thankful when the whole party had been successfully transferred from rocks to dinghy and from dinghy to the ketch.

As we left the lee of South West, we found that the seas had not been idle while we explored, and we scudded home in front of a mild gale, surfing on waves astern which showed how much the sea had got up. In next to no time we were back in our sheltered cove on Erith, but full of determination that next time we would have a longer stay on this island of differences.

Ascent of Phillpot Peak, Dover Island

George Phillpot was a young seaman, a ship's boy in fact, who died aboard the Royal Navy's survey vessel *Myrmidon* on 23 December 1886, and is buried above West Cove on Erith Island. The solid cross erected above his grave by his shipmates is

South West Island from the east. The landing point was the conspicuous gully slightly left of centre.

Photo: M. A. Marginson.

still a constant source of interest to visitors and the children of our party. The second highest peak on Dover Island, 747 feet in height according to the survey of his own colleagues, has been named after him.

The vicinity of Phillpot Peak has always appeared to us the most inaccessible part on Dover Island, mainly because our own investigations over the years have gradually worked down the island in a south-westerly direction from the swashway, the point at which Dover Island touches Erith Island. It is the fourth prominence of Dover Island, working in this direction, and commands the approach to the top of the imposing precipices of West Bluff, some five hundred feet in height. We have found that it is virtually impossible, for a party of our character, to work down the ridge of Dover Island. Thus in 1966-7 we investigated the area around Mount Mullett, at the north-east end of the island, climbing directly up from the swashway. In 1968-9 we portaged our boat through the swashway, landed in Myrmidon Bay, and climbed directly up to the highest point of the island, Hoskyn Peak (774 feet). At that time we reconnoitred a further possible landing point in what we call Francis Cove, between Francis Point and Beagle Point on the exposed western side of the island, which we hoped would give access to the toe of the island. This prognosis proved correct.

On 16 January 1970, a beautiful day with some haze obscuring the islands far out to sea, we left our quarters on West Cove at 10.30 a.m. (T.S.T.) with a fully-loaded dinghy containing seven members of the party. Portaging across the swashway, and motoring around the north-west cliffs of Dover, we landed fairly easily on the large, slippery granite boulders of Francis Cove, just one hour after leaving home. We carried our dinghy well up above high water mark and revelled to find here, fringing the tumbled rocks of the shoreline, a splendid springy carpet of mesembryanthemum amid

the tussock-grass, just right for changing into climbing clothes and (on our return) lunching and reclining after our ascent. In this vicinity were also many flourishing examples of the Cushion-bush (*Calocephalus brownii*), which were later also put to good use.

The first stage of our climb was simple: through the tussock-grass and, in only a few minutes, to the top of the ridge overlooking Francis Cove. Here we found ourselves on the neck of the peninsula which runs out to Beagle Point, and already commanding a magnificent prospect: to the south-west the great cliffs running round to West Bluff; straight down, through a cleft in the cliff on which we stood, to a seal playing in the surge over the rocks; to our north, some fine stands of casuarina on the Beagle peninsula. Just where we were standing the rocks were spectacularly daubed with a lichen like splashes of vivid red ochre. The vegetation here comprised some of the largest clumps of the Grass Triggerplant (*Stylidium graminifolium*) that we have seen anywhere, together with the Round-leafed Correa (*C. reflexa* var. *nummulariifolia*), the Crimson-berry (*Cyathodes juniperina*), the Coast Swainson-pea (*Swainsona lessertiifolia*), the Common Fringe-Myrtle (*Calytrix tetragona*), the Tall Daisy (*Brachycome diversifolia* var. *maritima*) and the Sea Box (*Alyxia buxifolia*). The Hop Goodenia (*G. ovata*) was, as elsewhere on Dover Island, present, as were two rushes, a Club-rush and the Sea Rush (*Juncus maritimus*). The whole was dispersed amid the *Poa* grass.

So far we had only been ascending the glacis of the island: now came the real defences though, to our surprise, they proved far more negotiable than the formidable groves we had met further to the north in previous years. The same Coast Tea-Tree was here, in thick interlaced groves, so that initially we decided to try to

Landing Beach, Francis Cove, Dover Island. Erith Island is in distance.
Photo: Julie Marginson.

A typical "washaway" or shallow erosion gully above Francis Cove, Dover Island.
Photo: M. A. Marginson.

climb gingerly around the edges of the cliffs. We soon found, however, that the tea-tree was more stunted and dispersed than we had found on the slopes of Hoskyn Peak, and did not form the climax forest that we had struggled through there. Our progress was aided by the fact that it was shot through at many points by open patches and washaways, often sprinkled with small quartz, or larger granite, pebbles. These washaways, which we can only assume are periodic watercourses, are a distinctive feature of this section of Dover Island, and the only evidence we have seen on the island that would point to a lack of physical stability.

After some initial difficulties we pushed our way fairly rapidly through the scrub, noting the frequent bushes of red correa flowering profusely, as was the Manuka (*Leptospermum scoparium*) from about three hundred feet. We also collected specimens of the Slender Rice-flower (*Pimelea linifolia*), the Bulbine Lily (*Bulbine bulbosa*), the Variable Groundsel (*Senecio lautus* subsp. *dissectifolius*), the Common Heath (*Epacris impressa*), the Coast Boobialla, and of mosses and fungi met with from about 450 feet. At about this level we came across dwarf casuarinas and our first eucalypts, three or four trees, semi-prostrate and five to six feet high, existing as an island community in a sheltered gully, and surrounded by thick tea-tree.

Phillpot Peak now looked close, and granite outcrops were occurring to mitigate the trials of the increasingly steep rise. What we were looking at, however, was a false crest, and a long and rough scramble was still ahead of us. As soon as we moved over into any lee we found, as we had on previous

trips, that the vegetation can suddenly spring up profusely to ten feet or more in height. This was particularly so with the robust Oyster Bay Pines (*Callitris rhomboidea*), which we had first met with at about 350 feet, and the gums (Shining Peppermints, *E. nitida*) now becoming an important part of the cover.* Finally, after some high-stepping over and around weathered granite outcrops, we came on a sloping rock face which gave us access to the peak, some two hours after we had left the shoreline. So far as we know ours was the first ascent.

The view to the east, across the southern mouth of Murray Pass to the highest cliffs of Deal Island, was magnificent. So too was the southern aspect out to South West Island, some eight miles away, a tantalising prospect, for we were then uncertain whether we should be able to reach it. The outlook that held our attention most firmly, however, was that immediately below us and out to the West Bluff of Dover Island, the utmost inaccessibility, which we still hope one day to reach. A great shallow gully, perhaps half a mile wide and open to the west, sloped away beneath us, choked with thick growth. To our left the main ridge of the island continued beyond Phillpot Peak to the heights of West Bluff. Far away, above the precipices of West Bluff, we could see tall eucalypts standing out above the lower scrub: an unusual and an enticing sight. It seems likely that a practicable route lies along the ridge to those gums.

Around the peak, on which we built a cairn, the vegetation was thick and three to four feet high, with eucalypts up to five feet. Apart from these we distinguished a mixed cover of Crimson-berry, Manuka, Coast Tea-Tree, Oyster Bay Pine and dwarf casuarina. Many dead branches strewing the ground indicated the force of the prevailing winds from the west but, for all that, we got the impression that West Bluff protects this peak from the worst of the weather.

In the general area of, and somewhat below the peak, we collected specimens of the Variable Sallow Wattle (*Acacia mucronata*), the Large-leaf Bush-pea (*Pultenaea daphnoides*), the Common Aotus (*Aotus ericoides*) and the Dusty Daisy-Bush (*Olearia phlogopappa*).

After a leisurely and pleasant sojourn on our west-facing rock face near the peak we descended rapidly, in fifty minutes, to the shoreline at Francis Cove, experiencing only a few tangles in the tea-tree thickets about two-thirds of the way back, but pausing again to inspect the distinctive erosion pattern which interested us so much. On the whole trip we saw no snakes (though the White-lipped is found on Dover) and no animals, although the Brush-tailed Possum is present on Dover as well as elsewhere in the Kent Group, and may be a distinct (and smaller) variety of the Tasmanian subspecies found on King and Flinders Islands.[5] Further, Dover Island, for some strange reason, appears to be relatively lacking in bird life.

This expedition, though not as difficult an operation as at first we had feared, was a useful extension of our investigations of Dover Island, which may now be said to have been "sampled" at both extremities and in the middle. We feel we have

*We assume that the gums mentioned in the previous paragraph are of this species. This identification, made from fruits collected, presumably disposes of the tentative identification of Dover Island eucalypts discovered on our previous trip as **E. viminalis** (see **Vic. Nat.**, Vol. **86**, No. 9, September 1969, pp. 259 and 268).

established that, within the confines of that relatively small island, there is an interesting range of plant adaptations to topography, and that an infinity of specialised studies on this virgin island is possible, so long as it remains inviolate and unharmed.

Our outing concluded with a pleasant, leisurely trip back close under the cliffs of Myrmidon Bay; since the tide was up, a less arduous portage across the swashway, and a few anxious moments as our deep-laden boat hit some heavy swells as we came around the headland into West Cove.

* * *

The Birds of the Kent Group*

In extensive wandering, some at night, throughout a nine-day visit to the Kent Group in January 1970 I identified twenty-six native species of birds (twenty-one positively, five tentatively) and five non-native European species.

Other records and information indicate the number of reported native species to be about sixty-seven for Kent Group birds. More investigation is required, particularly of land species, as present-day occurrence of various of the species is uncertain.

During my period on these islands the weather was mainly fine, but with strong winds at times. Most of the period was spent on Erith Island, with about twelve hours in four visits to Dover Island, about eight hours in the field on Deal Island, and two hours on South West Island. North East Island was not visited.

Apart from the strong impression I experienced of being on a sea-girt group of small islands, with spectacular coastal landscapes, my attention was most affected by the sparse occurrence of birds in species and individuals, whether in scrub and forest, open downs, sandy beach, rocky coast or seaward. I had

*This section of this article is contributed by Jack Jones and is related in the first person.

Panorama of Dover Island, January 1970, from Erith Island, Phillpot Peak, the ascent of which is described in this article, is the highest prominence above the cliffs to the right. The landing point in Francis Cove is below Phillpot Peak in this picture.

Photo: M. A. Marginson.

expected that the birds of the Group would be numerous about the coasts and beaches, and that interesting, perhaps exciting, rediscoveries might be made in grasslands, scrub and forest. However, my finding supports those of S. A. White (1909) and A. H. E. Mattingley (1938) that bird life on the islands is not numerous.[6] Indeed, it may have considerably declined during the course of this century, perhaps as the result of the burning of grasslands and scrub for grazing purposes on Deal Island throughout the period, and on Erith Island since the early 1950's at least.

Apart from grasslands, which are not present on Dover Island, there is probably no essential difference between the three major islands as far as the likely occurrence of species is concerned. North East and South West Islands, however, which are small, outlying, craggy islands, together present a separate ornithological experience, for here we find a considerable breeding of several species of pelagic birds. This should have close attention at intervals throughout the season, with observers present for several days at a time, because there are few published records, all of which resulted from daytime visits of a few hours each.

Birds observed

The list names the thirty-one species identified by me, including five tentatively, and the islands where seen (but I am not asserting that any of the species does not occur on islands where no sightings were made).

Native Species	Erith Is.	Dover Is.	Deal Is.	South West Is.
Fairy Penguin, *Eudyptula minor* (a)	X	—	—	X
Short-tailed Shearwater, *Puffinus tenuirostris* (a)	X	—	—	X
Black-faced Cormorant, *Phalacrocorax fuscescens*	X	X	X	—
Silver Gull, *Larus novae-hollandiae*	X	X	X	X
Pacific Gull, *Larus pacificus*	X	X	—	X
Sooty Oyster-catcher, *Haematopus unicolor* (a)	X	X	—	X
White-faced Heron, *Notophoyx novae-hollandiae*	X	X	—	—
Cape Barren Goose, *Cereopsis novae-hollandiae*	—	—	—	X
White-breasted Sea-Eagle, *Haliaeëtus leucogaster*	X	X	X	—
Peregrine Falcon, *Falco peregrinus*	—	—	—	X
Brown Hawk, *Falco berigora*	X	—	X	—
Nankeen Kestrel, *Falco cenchroides*	X	X	X	—
Brush Bronzewing Pigeon, *Phaps elegans*	—	—	X	—
Bronze-Cuckoo yg., probably Horsfield, *Chalcites basalis*	X	—	—	—
Fan-tailed Cuckoo, *Cacomantis flabelliformis*	X	—	—	—
Welcome Swallow, *Hirundo neoxena*	X	—	X	—
Tree-Martin, *Hylochelidon nigricans*	X	—	X	—
Grey Fantail, *Rhipidura flabellifera*	X	X	X	—
Flame Robin, *Petroica phoenicea*	X	X	X	—
Thornbill, probably Tasmanian, *Acanthiza ewingi*	X	X	X	—
Scrub-Wren, probably Brown, *Sericornis humilis*	X	X	X	—
Silvereye, *Zosterops lateralis*	X	X	X	—
Crescent Honeyeater, *Phylidonyris pyrrhoptera*	X	—	X	—
Pipit, *Anthus australis* (b)	X	—	X	X

Beautiful Firetail, *Zonaeginthus bellus*	X	—	—	—
Raven, probably Tasmanian, *Corvus tasmanicus*	X	—	—	—
Introduced Species (to Australia):				
Blackbird, *Turdus merula* (c)	X	X	X	X
House Sparrow, *Passer domesticus*	—	—	X	—
Goldfinch, *Carduelis carduelis*	X	X	X	—
Greenfinch, *Chloris chloris* (c)	X	—	X	—
Starling, *Sturnus vulgaris*	X	—	X	—

Reference (a). Other members of the party with which I visited South West Island saw the Sooty Oystercatcher, Fairy Penguin, and chicks of the Mutton-bird.

Reference (b). The birds seen by me on Erith and Deal Islands were probably the Pipit, but I assumed the identification at each sighting, without taking care to identify positively. Only one bird was briefly seen by me on South West Island, without opportunity to identify positively. (The Pipit has been reported by others for the Kent Group, including collection of eggs by the 1890 party.) Occurrence of the European Skylark, *Alauda arvensis*, on the grasslands of Erith and Deal Islands is a possibility, if not now—then in the future. The Skylark has become abundant on Flinders Island since its first sighting there in 1928,[7] greatly exceeding the indigenous Pipit which was recorded in 1912 as thinly distributed.[8]

Reference (c). I did not see or hear the Blackbird or Greenfinch on Deal Island. Mr. Clive Cocum (the then assistant lightkeeper) told me that both are seen frequently enough about the settlement area, close to East Cove.

Campbell's List

The only list of birds of the Kent Group published in a natural-history journal is that of A. J. Campbell. This appeared in 1891 as part of the report of the Victorian Field Naturalists' Club expedition to the Kent Group in the previous year.[9] The list names fifty-four species, including a "Wattle Bird" species "reported having been seen by the lighthouse people" and identified by Campbell as being probably *"Acanthochaera inauris"* Yellow Wattlebird (*Anthochaera paradoxa*).

As the only list for reference, it has from 1891 to the present time been repeated or become usefully the base for private lists (notably that of J. H. and G. S. Hope, 1968), and thus has a status requiring appraisal after eighty years without revision.

Campbell's list includes twenty-three of the thirty-one species seen by me; the eight not in Campbell's list were White-faced Heron, Cape Barren Goose, Nankeen Kestrel, Blackbird, House Sparrow, Goldfinch, Greenfinch, Starling. Campbell's list should have included the House Sparrow, as the general report of the expedition states that two birds were seen near the lighthouse keeper's quarters, the only non-native species seen during the expedition. My list does not include thirty-one species in Campbell's list, as follows —

(The names used below are the 1926 RAOU Checklist[10] accepted names for the species concerned, as some of the scientific names used by Campbell have been placed in synonymy, and some of the vernacular names have been changed.)

Brown Quail, *Synoicus ypsilophorus*
Painted Quail, *Turnix varia*
Fairy Prion, *Pachyptila turtur*
Diving Petrel, *Pelecanoides urinatrix*
Black Cormorant, *Phalacrocorax carbo*
Gannet, *Sula serrator*
Spur-winged Plover, *Lobibyx novae-hollandiae*
Black Swan, *Chenopis atrata*
Black Duck, *Anas superciliosa*

Chestnut Teal, *Anas castanea*
Swamp-Harrier, *Circus approximans*
Goshawk, *Astur fasciatus*
Sparrowhawk, *Accipiter cirrocephalus*
Owl, *Ninox* sp.
Green Rosella, *Platycercus caledonicus*
Ground Parrot, *Pezoporus wallicus*
Sacred Kingfisher, *Halcyon sanctus*
Golden Bronze-Cuckoo, *Lamprococcyx plagosus*
Satin Flycatcher, *Myiagra cyanoleuca*
Golden Whistler, *Pachycephala pectoralis*
Olive Whistler, *Pachycephala olivacea*
Black-faced Cuckoo-Shrike, *Coracina novae-hollandiae*
Ground-Thrush, *Oreocincla lunulata*
White-browed Scrub-Wren, *Sericornis frontalis*
Dusky Wood-Swallow, *Artamus cyanopterus*
Striated Pardalote, *Pardalotus striatus*
White-naped Honeyeater, *Melithreptus lunatus*
Tawny-crowned Honeyeater, *Gliciphila melanops*
Yellow-winged Honeyeater, *Meliornis novae-hollandiae*
Yellow Wattle-bird, *Anthochaera paradoxa*
Black Currawong, *Strepera fuliginosa*

Unfortunately, the list and accompanying text (two articles, one by D. Le Souëf, leader of the expedition, the other by Campbell) are not reasonably complementary. Twenty-two of Campbell's listed species were not mentioned in the text, causing my doubt as to the actual sighting of some of the twenty-two species.

Six of the species not mentioned in the text as having been seen — Spur-winged Plover, Sparrowhawk, Ground Parrot, Sacred Kingfisher, *Fan-tailed Cuckoo, *Crescent Honeyeater — have a list notation "Skins seen", without mentioning in text or list, the collector, or when and where collected.

The other sixteen species not mentioned in the text do not have the "Skins seen" notation in the list, nor the other notation used in the list, "Eggs obtained" (which I have taken as being likely evidence that each species so noted was seen). They are Brown Quail, Black Cormorant, *White-breasted (Black-faced) Cormorant, Gannet, *Silver Gull, Black Swan, Black Duck, Chestnut Teal, Swamp Harrier, *Ninox* sp., *Welcome Swallow, *Tree Martin, Dusky Wood-Swallow, Tawny-crowned Honey-eater, Yellow-winged Honeyeater, and the assumed Yellow Wattle-bird.

However, the six species marked with asterisk were seen by me, and six of the remaining sixteen have been accepted by me on report by others. These are the Spur-winged Plover, Yellow-winged Honeyeater, Dusky Wood-Swallow, Gannet, Black Cormorant and Black Swan. This leaves ten species for further inquiry — Brown Quail, Black Duck, Chestnut Teal, Swamp Harrier, Sparrowhawk, *Ninox* owl sp., Ground Parrot, Sacred Kingfisher, Tawny-crowned Honeyeater and Yellow Wattle-bird.

Other than the Ground Parrot and Yellow Wattle-bird the species just named "for further inquiry", probably occur at times in the Kent Group (mainly or entirely on Deal and Erith Islands), as each is in normal distribution north and south of Bass Strait and each except the Sacred Kingfisher (a seasonal migrant to Tasmania) occurs on Flinders Island.

Le Souëf's article on the 1890 expedition included the comment that on Erith Island the plant *Goodenia* flourished in some hollows and "it is the favourite feeding ground of the Swamp Parrakeet, but none were seen on this occasion". But I have not found in the main reference works a published record of sight of the Ground Parrot (Swamp Parrakeet) in the Group, and I have strong doubt that it has been collected there. Campbell, in his *Nests and Eggs of Australian*

Birds, published in 1900, nearly ten years after his Kent Group list, mentions Gould's sighting of the Ground Parrot on Flinders Island (now apparently extinct there), but makes no mention of the species being also in the Kent Group, as included in his own 1891 list.

I have not found any record of a Wattle-bird species for the Kent Group other than Campbell's mention of it, described earlier in this article. (I saw at long distance on Erith Island a flying bird that looked like the Red Wattle-bird, *Anthochaera carunculata,* but did not include the possibility in my list; the species has apparently not been recorded for Bass Strait islands or Tasmania.) The Yellow Wattle-bird and Little Wattle-bird, *A. chrysoptera,* were reported for Flinders Island by Le Souëf, 1902,[11] but Green[7] in mentioning this also (by notation) classified the records as "doubtful and requiring more positive confirmation before inclusion in the list of local avifauna is justified".

Fourteen of the thirty-one species in Campbell's list not seen by me were mentioned in the text of the 1891 report as having been seen (some were also mentioned as being collected for specimens), or were included in the list with the notation "eggs obtained" and are thus assumed by me to have been seen. They were the Painted Quail, Fairy Prion, Diving Petrel, Goshawk, Green Rosella, Golden Bronze-Cuckoo, Satin Flycatcher, Golden Whistler, Olive Whistler, Black-faced Cuckoo-Shrike, Ground Thrush, Striated Pardalote, White-naped Honeyeater and Black Currawong. I gave close attention in suited areas on Deal Island for possible sighting of the Satin Flycatcher, Golden Whistler, Olive Whistler and Ground Thrush, but did not see any of those species in the few hours occupied. All of the fourteen species have been recorded for Flinders Island (Green[7]) except the White-naped Honeyeater. For that species Green states "Campbell (1891) lists it from the Kent Group and White (1909) records it also on Deal Island. However, it is suggested that these authors may have mistakenly determined the somewhat similar *M. validirostris* or *M. affinis* for this species".

The two species are the Strong-billed Honeyeater and Black-headed Honeyeater, both of which occur on Flinders Island. Campbell claimed the White-naped Honeyeater, of which he collected a specimen, as a new record for Bass Strait islands, but this did not become accepted.

Campbell's list included two species of "Scrub-Tit" (now Scrub-Wren), one of which, the White-browed, *Sericornis frontalis,* a mainland species common in Victoria, he claimed in his article accompanying the 1891 list as a new species for the Kent Group. He maintained the claim in his *Nests and Eggs,* but with the modification proposed by W. V. Legge in 1896[12] (using Kent Group skins collected and provided by Campbell) that it be recognized as a subspecies of *S. frontalis,* with the name *S. f. gularis.* However, the proposal did not stand in twentieth-century taxonomy, and *gularis* became recognized as being *S. humilis,* the other Scrub-Wren included in Campbell's list, known then as Sombre-coloured Scrub-Tit, now as Brown Scrub-Wren. Thus occurrence of the White-browed Scrub-Wren in the Kent Group has now no official concurrence. It is ironical that Campbell in his *Nests and Eggs* described the "Geographical Distribution" of the Brown Scrub-Wren (the name used in *Nests and Eggs*) as "Tasmania, King Island and Furneaux Group", and

made no mention in the text that he had included the species in his 1891 Kent Group list.

I support the opinion of Dr. D. L. Serventy, in his description of speciation problems on Bass Strait islands (he provides ornithological examples, but not including *Sericornis*):

> Obviously something interesting is happening in these isolated small populations and it would be of value if museums were to make collections of Passerines — and other terrestrial fauna —on these islands to document the phenomenon. Obviously, with the small populations involved it would be injudicious, from the conservation point of view, to collect too many individuals at the one time, but specimens should be 'harvested', as it were, by small gatherings at periodic intervals. In this way sufficiently large samples, statistically significant, could be accumulated for study.[13]

Other Sightings

The report[6] by S. A. White of a brief visit to Deal Island in 1908 adds two species not included in the Campbell and Jones lists —

Hooded Dotterel, *Charadrius cucullatus*

Grey Shrike-Thrush, *Colluricincla harmonica*

Having expected to see the Hooded Dotterel, I described it at a camp gathering during my visit, and asked had it been seen. One person reported a bird, fitting the description of the black-headed male. It was seen on Erith's West Cove beach a few days before my arrival. The Hooded Dotterel and Grey Shrike-Thrush are breeding residents of Flinders Island.

Four more species that can be added with certainty to the Kent Group list are —

Crested Tern, *Sterna bergii*

Pied Oyster-catcher, *Haematopus ostralegus*

Wedge-tailed Eagle, *Uroaetus audax*

Barn Owl, *Tyto alba*

The Crested Tern and Pied Oyster-catcher were seen at Erith Island by several of the camp members at the 1969 visit. The Wedge-tailed Eagle "turns up" from time to time about Deal Island. I was told by Mr. Bob McNeill, head keeper of the lighthouse. It is a breeding resident of Flinders Island. Mr. Cocum described to me an owl that had died after a flight crash into a building when disturbed at a fuel heap where rats occur; the description fitted the Barn Owl, an identification also given to Mr. Cocum by a visitor who saw the carcass.

Three more species are included here as possibilities because of the circumstances of reporting —

Blue-winged Parrot, *Neophema chrysostoma*

Swift Parrot, *Lathamus discolor*

Black-and-white Fantail (Willie (Wagtail), *Rhipidura leucophrys*.

Mr. McNeill described to me the occurrence from time to time, including that shortly before my visit, of small green-headed parrots, seen in grass areas along the vehicle track from the settlement to the lighthouse. He said they were similar in appearance to the "grass parrots" he knew in the Shepparton district of Victoria. The description suggested the Red-backed Parrot, which has not been recorded for the islands of Bass Strait or for Tasmania. The grass location does not suggest the Swift Parrot, *Lathamus discolor*, which occurs in Tasmania and Victoria and has been recorded for Flinders Island; Dr. Stephen Murray-Smith reported[14] for Dover Island a small flock of parrots feeding in scrub, distinguished by red crowns and blue-tipped wings, which he identified tentatively as the Blue-winged Parrot, *Neophema chrysostoma*, but which I now consider were more likely to have been the

Swift Parrot. No *Neophema* species has been recorded for the Kent Group but R. H. Green informed me recently of unpublished records of sightings and a specimen of *N. chrysostoma* for Flinders Island, made since publication of his *Birds of Flinders Island*.[7] Occurrence of the species in Victoria, Tasmania, King Island and Flinders Island indicates that the grass parrots seen by Mr. McNeill were Blue-Winged Parrots.

Mr. Cocum gave me a list of birds seen by a visitor to Deal Island, which included the Willie Wagtail, and I have included it here because the species has been recorded for Flinders Island, and because of Mattingley's interesting note of the species in flight *over sea* . . . "When close to Cliffy Isle a Willie Wagtail arrested our attention as it winged its way towards this isle."[6]

Other Possible Species for the Kent Group

There are several species that have not been reported for the Kent Group, but are likely to be added to the list if more frequent watching and reporting occurs. All of the species named below have been recorded at or adjacent to Flinders Island.[7]

The open seas and coastal waters are the most likely habitats for sighting of further species.

Attention to breeding on North East and South West Islands may add the White-faced Storm-Petrel, *Pelagodroma marina* (an egg collected on North East Island during the 1890 expedition was assumed to be of this species, but the species was not included in Campbell's list). Attention to other pelagic birds in passage among islands of the Group should add at least the Giant Petrel, *Macronectes giganteus;* Dove Prion, *Pachyptila desolata;* White-capped Albatross, *Diomedea cauta;* and possibly the Black-browed Albatross, *D. melanophris*, and Southern Skua, *Catharacta skua.*

Species usually seen in coastal waters, bays and coves of Flinders Island, and thus likely for the Kent Group but not yet recorded, are the Australian Pelican, *Pelecanus conspicillatus;* Caspian Tern, *Hydroprogne caspia;* White-fronted Tern, *Sterna striata;* Fairy Tern, *S. nereïs;* and Musk Duck, *Biziura lobata.*

Various of the small "waders" are a possibility in seasonal or brief occurrence on the shores of coves, including Turnstone, *Arenaria interpres;* Double-banded Dotterel, *Charadrius bicinctus;* Red-capped Dotterel, *C. alexandrinus;* Red-necked Stint, *Erolia ruficollis;* Sharp-tailed Sandpiper, *E. acuminata.*

Steady attention to watching and reporting of land birds on Deal, Erith and Dover Islands may add to the list of species, including Pallid Cuckoo, *Cuculus pallidus* (migrating across Bass Strait); and Strong-billed Honeyeater, *Melithreptus validirostris*, or Black-headed Honeyeater, *M. affinis.* It is likely, however, that practically all species of normal occurrence in grasslands and scrub of the Kent Group have been recorded.

Other Comments

Sea species — In my inexperience of watching birds at sea, the only species identified by me with certainty were White-capped Albatross and Short-tailed Shearwater (Mutton-bird), when "ketching" from and to Port Albert. Other species seen were probably Fairy Prion and Diving Petrel. I did not see Gannet or Caspian Tern, en route or at Kent Group. I found a small rookery of Mutton-bird on Erith Island, and was told there are a few small

rookeries on Deal Island; there are large rookeries on North East and South West Islands. The Fairy Penguin was attending to young on Erith Island, and I was told, breeds on all other islands of the Group. On South West Island I found wings at several places, apparently feeding spots for the four Peregrine Falcons seen there at our visit to the island; a specimen wing has been identified by Mr. Alan McEvey as that of *Pachyptila turtur,* the Fairy Prion. I also saw at South West a grebe-like bird, which I could not identify from the tossing ketch; it was possibly a Diving Petrel, which Mattingley, in his *Birds of the Hogans,* has stated "could be readily mistaken for a grebe under certain conditions . . ."[6]

About the Shores — The Silver Gull was the only species seen by me in any number, but not large. The four other species seen by me — Pacific Gull, Sooty Oystercatcher, Black-faced Cormorant, White-faced Heron —were all few in number. As mentioned above, a member of my party told me that before my arrival Crested Terns had been seen, not infrequently, co-habitating with Silver Gulls on the beach at West Cove; and another member reported a bird at West Cove the week before that matched my description to him of a male Hooded Dotterel.

"Large stuff"—This ranged in size from eagles to pigeons. One or two White-breasted Sea-Eagles were usually seen daily. (Mr. McNeill told me he has seen the Wedge-tailed Eagle over Deal Island "now and then".) I saw few Brown Hawk and Nankeen Kestrel, but they were dispersed over Erith and Deal, the Kestrel also being seen on Dover. The Peregrine Falcon was seen by me only on South West, and has been recorded for North East, and no doubt occurs also on Erith and Deal. The Cape Barren Goose has been reported on all of the islands, but was seen by me (two birds) only on South West. A few Ravens were usually to be seen about West Cove. I did not see the Black Currawong. I was watchful for parrots, but saw only some covert feathers under thick scrub on Dover Island, later identified positively as being from the Green Rosella. I saw one only of Brush Bronzewing Pigeon, on Deal Island.

"Small stuff"—The native species most frequently seen were Grey Fantail, Flame Robin, Scrub-Wren, Thornbill, Silvereye and Beautiful Firetail, but none was numerous. The Scrub-Wren and Thornbill could not be identified by me with conviction, despite considerable watching, particularly of scrub-wrens in what appeared to be family parties, including birds in apparently juvenile plumage. I am guided by Green's description[7] of identification problems, and his opinion that the Flinders Island species of scrub-wren and thornbill are the Tasmanian species, Brown Scrub-Wren, *Sericornis humilis,* and Tasmanian Thornbill, *Acanthiza ewingii.* I had two sightings in one area of Fan-tailed Cuckoo (probably the same bird); one sighting of a young cuckoo in flight calling for food from nearby Flame Robins, and identified by me then as Horsfield Bronze-Cuckoo; several sightings of a few Welcome Swallow and Tree-Martin; and two sightings of Crescent Honeyeater, each of one bird. I was watchful all the time in suited habitat for other species recorded for the Kent Group — Golden Bronze-Cuckoo, Satin Flycatcher, Golden Whistler, Olive Whistler, Grey Thrush (by S. A. White, 1908, not by Campbell), Black-faced Cuckoo - Shrike, Ground Thrush, Dusky Wood-Swallow, Striated Par-

dalote, White-naped Honeyeater, and Yellow-winged Honeyeater, but did not see any.

No information appears to exist concerning movement of migratory species (Sacred Kingfisher, the Cuckoos, Welcome Swallow, Tree Martin, Grey Fantail, Satin Flycatcher, Flame Robin, Dusky Wood-Swallow) and of nomadic species (Silvereye, possibly also Honeyeaters). Mr. Frank Goold of Port Albert told me that when he was engaged in professional fishing in Bass Strait he saw at times several Flame Robins flying north just above the water and appearing as though at any moment the birds would fall into the waves.

Non-Australian Species: The Blackbird appears to be not uncommon, and is dispersed over all of the Kent Group. Mattingley reported it at his 1938 visit to Deal Island, but no other non-native species. It was a surprise to me to find it on South West Island, six birds being flushed from one place in low vegetation. Mattingley found the Blackbird on similarly exposed Hogan Island, causing him to comment that it —

". . . evidenced the fact that they are able to fly a considerable distance over the sea".

The Starling was seen by me, mainly in one place, the Vale of Erith adjacent to West Cove; about a hundred birds or so judged by roosting flight. The Goldfinch was not uncommon on Erith and Deal, but I saw only two of the Greenfinch, on Erith; also a few House Sparrow, the latter about the lighthouse keepers' houses on Deal Island. Each of the five species, and also the Skylark, are breeding residents on Flinders Island.[7] Some of the species appear to have been introduced by man to Flinders Island (the Blackbird about 1930[7]), but for the Kent Group the colonization of the five species appears to have been by natural distribution, unless introductions occurred through lighthouse staff.

* * *

Weather Observations at Erith Island

In last year's report we described our continuous readings over twenty-eight days of temperature and relative humidity, analysed for us on a comparative basis by Dr. F. A. Berson. This year the meteorological effort was enlarged, and to our self-recording thermohygrograph (the "hermaphrodite") we added a companion piece of equipment, in the shape of a Lambrecht wind recorder, Woelfle type (the "woofler"). This complex and expensive instrument consists of a cup anemometer system with vane, recording continuously on a clock-work driven waxed chart the direction of wind and the "run of wind" (i.e. the speed of the wind multiplied by the time). No previous wind recording with an instrument of this sophistication has been carried out in the central region of Bass Strait.

Our thermohygrograph, the daily servicing of which was carried out with dedication by Malcolm Anderson, was again lent to us by the CSIRO Division of Meteorological Physics. The woofler was lent by the Commonwealth Bureau of Meteorology. It should be pointed out that the woofler is not designed to measure wind gusts, which was something of a disappointment to the

sensationally-minded amongst us, cowering at times from the cannon-like booms which heralded a particularly apocalyptic gust, and which had all but the strongest-nerved wondering how long canvas could stand it. The hermaphrodite did however perform one scientific function for which it was not designed: on Christmas Eve it gave us a measure of wind-gust strength when it was twice blown off its stand in our camp to land six feet away. It weighs eighteen pounds. After that it was firmly tied down.

The woofler was carried by a complaining party to the crest of One Tree Hill in the south-west of Erith Island. Here we erected the instrument above a sturdy metal pole, two metres in height and strongly stayed against gales and the incursions of wandering cattle. The site was chosen for a combination of altitude (about three hundred feet), absence of local obstructions and exposure to prevailing winds. Unfortunately difficulties of access from the camp, with a minor malfunction of the instrument, restricted the continuous recording period to twenty-five days.

Wind directions and speeds during a period as short as this are even less representative of the regime than temperature and humidity recordings. Nevertheless, a comparison can again be made with a mainland station such as Aspendale on the eastern littoral of Port Phillip Bay. Hourly mean values of direction and speed were formed for Erith Island and Aspendale, at the latter station from a Dines anemograph recording the wind at forty feet above sea level.

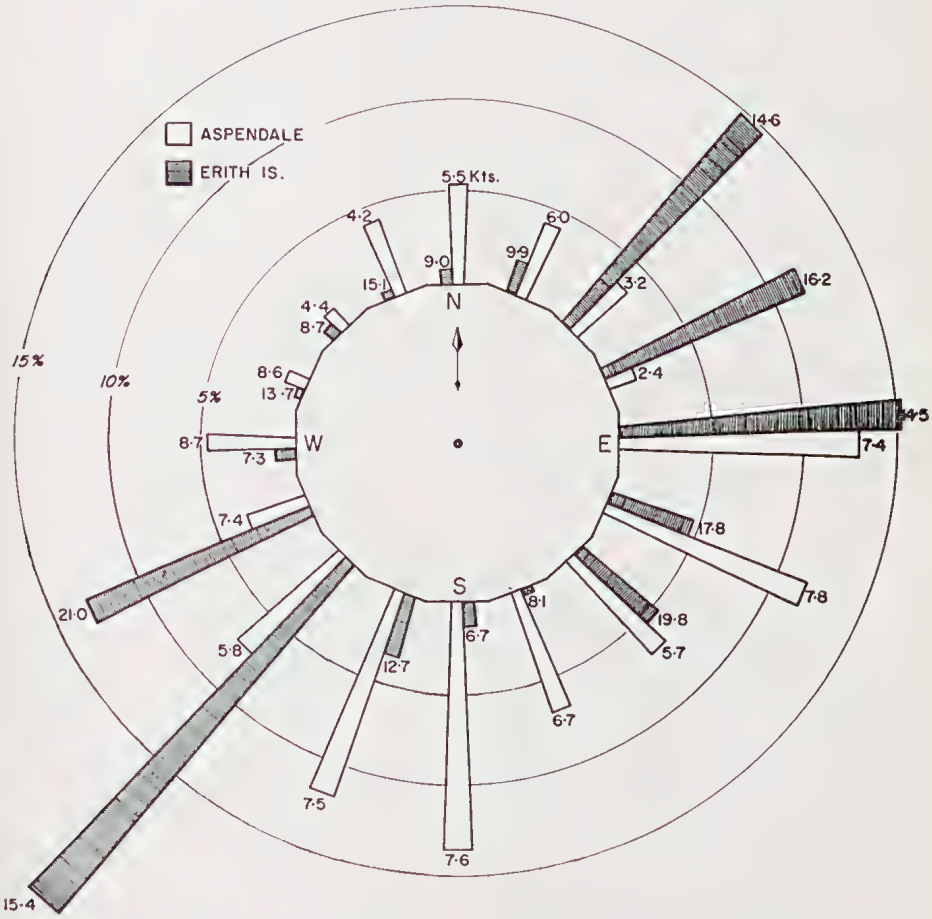
The wind-rose in the diagram shows the run of wind for sixteen points of the compass as a percentage of the totals, i.e. 8,579 nautical miles at Erith Island and 3,864 miles at Aspendale. The average wind strength at the island was thus more than twice as high as at the mainland station (the building effects at Aspendale, reducing the average speed, would not alter this factor significantly). The diagram demonstrates for Erith Island a strongly bi-modal distribution with regard to

Erection of "woofler", Erith Island, December 1969.

Photo: M. A. Marginson.

direction: 51% of the total run of wind occurred with easterly winds (NE to SE direction) and 39% with winds from the SW quadrant, the remaining 11% being distributed fairly evenly among all other points of the compass. At Aspendale, about 60% form an arc extending from E through S to SW with no other preferred direction.

The numbers written at the end of the direction indicators give the mean wind speed associated with a given direction. As mentioned already, on the island the wind blew twice as hard on the *average*, but it is seen from the diagram that south-easterlies and south-westerlies were about three times stronger than at Aspendale. South-westerlies of



Direction and run of wind at Erith Island, Bass Strait, 27 December 1969-20 January 1970, compared with that at Aspendale, Victoria.

Length of spokes gives percentage of total run of wind for each direction (run of wind = speed by time). Figures represent the average windspeed in knots from the relevant direction.

Note the high average wind speeds associated with WSW and ENE winds, this diagram clearly showing the channelling effect of the orientation of Bass Strait on wind speed and direction.

this strength and persistence are unusual for the time of year and were caused by the passage across the region of a couple of depressions associated with vigorous cold fronts. It will be noted that the highest average speeds occurred with WSW and ENE winds, i.e. with directions paralleling the orientation of Bass Strait. This channelling effect of Bass Strait on air streams is of considerable importance to meteorologists and seafarers alike, and has not previously been directly observed in the Bass Strait sea-way.

The anomalous wind regime is also reflected in the temperature and humidity observations on both the island and the mainland. The average recorded daily maximum temperature during the present expedition period was 66.2°F at Erith Island and 72.9° at Aspendale. These values are 5.5° and 6.6° lower than in the comparable period of the previous expedition (30/12/68 to 26/1/69). The average minimum temperatures were 56.3° and 54.6°, a decrease by 3.2° and 2.6°, respectively. The corresponding average daily temperature *ranges* of 9.9° and 18.3° were 2.7° and 4.0° smaller than in the previous period. It is remarkable how little these changes from January 1969 to January 1970 differ as between the two places.

As to the recorded relative humidities, the average values at 0900 hrs. (E.S.T. and T.S.T., respectively) during the previous expedition were 79% at the island, but only 49% at Aspendale. For the present period we prefer to compare the average daily minimum humidities. These were rather high, viz. 59% and 54% for the two stations, and their closeness clearly bears out the levelling effect of over-riding synoptic-scale influences in this recent period. Thus at Aspendale the average minimum humidity was even slightly higher in January 1970 than the average morning value in 1969.

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Appendix I

In the course of the investigations reported in this paper twenty new botanical records were made for the Kent Group, three being new to Bass Strait. As before, we are most grateful to Mr. J. H. Willis, of the National Herbarium, Melbourne, for his identifications. We list here the new records.

Stiff Rye-grass (*Lolium loliaeceum*), Vale of Erith. (Naturalized plant.)
Cocksfoot (*Dactylis glomerata*), Vale of Erith/Valley of the Noonflowers traverse. (Naturalized plant.)
Soft Brome (*Bromus mollis*), Vale of Erith. (Naturalized plant.)
Sterile Brome (*Bromus sterilis*), Vale of Erith. (Naturalized plant.) New to Bass Strait.
Red-Top Bent (*Agrostis gigantea*), Vale of Erith/Valley of the Noonflowers traverse (Naturalized plant.) New to Bass Strait.
Hares-tail (*Lagurus ovatus*), Vale of Erith/Valley of the Noonflowers traverse. (Naturalized plant.)
Coast Saltbush (*Atriplex cinerea*), South West Island.
Orache (*Atriplex hastata*), Vale of Erith/Valley of the Noonflowers traverse. (Naturalized plant).
Soft Cranesbill (*Geranium molle*), Vale of Erith. (Naturalized plant.)
White Correa (*Correa alba*), South West Island.
Giant Hop-bush (*Dodonaea viscosa*), Dover Island, near swashway.
Nightshade (*Solanum nodiflorum*), Erith Island. (Naturalized plant.) New to Bass Strait.
Bluebell (*Wahlenbergia quadrifida*), Vale of Erith/Valley of the Noonflowers traverse.
Twiggy Daisy-bush (*Olearia ramulosa*), hill between Valley of the Noonflowers and Wallibi Cove, Erith Island.
Flax-leaf Fleabane (*Conyza bonariensis*), Vale of Erith. (Naturalized plant.)
Showy Cassinia (*Apalochlamys spectabilis*), Vale of Erith.
Cotton Fireweed (*Senecio quadridentatus*), Vale of Erith/Valley of the Noonflowers traverse.
Shrubby Fireweed (*Senecio minimus*), Erith Island.
Shore Thistle (*Carduus tenuiflorus*), Vale of Erith/Valley of the Noonflowers traverse. (Naturalized plant.)
Thuidium furfurosum (moss), Erith Island.

Appendix II

We are grateful to Mr. Rex Filson, of the National Herbarium, Melbourne, for his identifications of the following lichens.

Dover Island

Francis Cove to Phillpot Peak.
Teloschistes spinosa (Hook. f. & Tayl.) J. Murray.
Cladia aggregata (Sw.) Nyl.
Cladia retipora (Labill.) Nyl.
Cladia sullivanii (Mull. Arg.) Martin.
Cladonia alpestris (L.) Raben.
Cladonia sp. (unfertile).
Usnea sp. (too small).
Usnea flexilis Stirt.
Menegazzia circumsorediata R. Sant.
Parmelia caperata (L.) Ach.
Parmelia harrisii Kurok.
Parmelia sp. (possibly undescribed).

South West Island

Teloschistes spinosa (Hook. f. & Tayl.) J. Murray.
Teloschistes chrysophthalmus (L.) Th. Fr.
Xanthoria ectanea (Ach.) Ras. ex. R. Filson.
Ramalina ecklonii (Spreng.) Mey. & Flot.
Microthelia atterrima (Anzi) Zahlbr.
Parmelia caperata (L.) Ach.
Physcia sp. (non-fertile).
Lecanora sp. (possibly undescribed).

Appendix III

Plants collected on South West Island

Fifteen plants were collected, and we have divided them into four categories according to our notes of their occurrence. These categories could well be modified by further investigation. The categories are based on whether a plant occurred in domains in which it was dominant (or co-dominant), or whether it did not occur in domains. Each of these categories is then split into two according to whether the occurrence outside domains was frequent or infrequent.

	Occurring in Domains	No Domains Found
Occurrence elsewhere frequent	*Disphyma australe* (Rounded Noon-flower) *Poa poiformis* (Blue Tussock-grass) *Senecio lautus* subsp. *dissectifolius* (Variable Groundsel) *Rhagodia baccata* (Seaberry Saltbush)	*Crassula sieberiana* (Austral Stonecrop) *Salicornia quinqueflora* (Beaded Glasswort) *Bulbine bulbosa* (Bulbine Lily) *Pelargonium australe* (Austral Storksbill) *Alyxia buxifolia* (Sea Box) *Correa alba* (White Correa)
Occurrence elsewhere infrequent	*Atriplex cinerea* (Coast Saltbush) *Lavatera arborea* (Tree Hollyhock)	*Tetragonia implexicoma* (Bower Spinach) *Brachycome diversifolia* var. *maritima* (Tall Daisy) *Lepidium foliosum* (Coast Peppercress)

Appendix IV

The following identifications of, and notes on, reptiles collected on Erith and Dover Islands during the summers of 1963, 1967, 1969 and 1970 have kindly been provided by Mr. Peter Rawlinson of La Trobe University.

REPTILIA
SQUAMATA
LACERTILIA

Scincidae

White's Skink (*Egernia whitei*, Lacepede)
Erith Island (1).

Metallic Skink (*Leiolopisma metallicum*, O'Shaughnessy)
Dover Island (1); Erith Island (36).

Three-lined Skink (*Leiolopisma trilineatum*, Gray)
Dover Island (1); Erith Island (4).

Bougainville's Skink (*Lerista bougainvilli*, Gray)
Dover Island (1).

OPHIDIA

Elapidae

White-lipped Snake (*Denisonia coronoides*, Gunther)
Erith Island (2).

It may be noted that the five species above have also been collected by me on Deal Island, together with an additional species not yet found on Erith and Dover Islands, the Southern Bluetongue lizard (*Tiliqua nigrolutea*).

All specimens have been catalogued into the University of Melbourne Zoology Department reptile collection, and will ultimately be lodged in the collection of the National Museum of Victoria.

The five species collected are widely distributed in the Bass Strait area, and all are shared with southern Victoria, most of the eastern Bass Strait Islands and Tasmania. Perhaps the most noteworthy feature of the reptile fauna is that none of the probable southern Victorian post-glacial intrusives (see Rawlinson 1967) have been recorded. This indicates that the reptile fauna of the Kent Group was derived from the same source as the present day Tasmania reptile fauna.

Reference

Rawlinson, P. A. 1967.
The Vertebrate Fauna of the Bass Strait Islands:
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Proc. Roy. Soc. Vict. **80:** 211-223.

The Pollination of *Corybas diemenicus* (H.M.R.) Rupp and W. H. Nicholls ex H.M.R. Rupp

by

David L. Jones

In September 1969 while examining flowering plants of *Corybas diemenicus* at Mount Morton, Victoria, I came across a tragedy of nature which I believe gives an important insight into the pollination of this orchid. One flower had a small insect on the labellum, with a pollinarium securely attached to its thorax. It was apparently the pollinating agent of the orchid and appeared to be dead. After a cursory glance, I popped the flower containing the insect into a bottle for closer scrutiny at home.

Some few hours later while examining the flower under a microscope, the full tragedy was revealed. The insect was securely entrapped in a tiny web on the surface of the labellum by a rear tarsal segment. Because it fitted neatly into the confined space there was very little room to manoeuvre. It had apparently struggled vigorously, but to no avail; for its wings were quite tattered. The predator had not returned to consume its victim, since apart from the damaged wings the body was in perfect condition.

The fact that the pollinarium attached to its back was in good order seemed to indicate that the insect had not been dead for very long.

After noting the insect's position relative to the column and labellum, I carefully extracted it from the flower. It was then measured, sketched and sent to the National Museum where it was identified by A. Neboiss as a member of the family Mycetophilidae or Fungus Gnats. Unfortunately this is as far as the identification could be taken since the family is a complex one badly in need of revision.

The family Mycetophilidae belongs to the order Diptera or two-winged flies. Its members are delicate, slender little gnats found in shady moist places. Many species breed in fungi but generally the life cycle is incompletely known. Flies of the family characteristically have a humped thorax and long antennae. They are separated into species, mainly on the characters of the antennae and wing-venation.

In Australia they seem to be very important in the pollination of galeate orchids. They have been previously reported[1 2], and I have made further observations in their role in other species. These will be dealt with more fully in a future article.

The species found on the Corybas labellum measured approximately 4 mm. long. It was quite dark and with the typical "hunchback" look to the thorax. The perfect adaptation of this gnat to pollination in confined spaces can be readily seen from the drawing. Its slender build enables it to manoeuvre in the cramped areas where it works. Also, whilst the insect is feeding the "hunchback" thorax is in the perfect position to pick up and deposit pollinia.

As there may be some doubt that this insect was associated with the pollination of *Corybas diemenicus* I made a careful examination of the pollinarium of its thorax. Comparisons with fresh pollinaria showed that it was identical, and undoubtedly from a flower of *C. diemenicus.* I have no doubt that the insect I found

is associated with the pollination of this orchid.

The mechanism adopted by the orchid to ensure cross pollination seems simple and relatively ineffective considering the small number of swollen ovaries one sees on this species.

Mycetophilids and other micro-dipterans seem to be attracted to decaying smells[3], and it is possible that this orchid emits such a scent. I was not able to observe any behavioural details of the insect since it was dead when I found it, and also, I have not been able to determine any scent from the orchid. This of course does not rule out such a perfume which may be imperceptible to us, but attractive to the gnats. In fact it is quite probable that such an attraction does exist since the orchid is so inconspicuous.

A second attraction is possibly provided by nectar. There appears to be two small glands situated on each side of the base of the column which may be nectaries or even scent-glands. These seem to be quite moist and supply fluid without puncture. E. Coleman reported a projection just below the stigma in *C. aconitiflorus* Salisb. which supplies nectar after puncture[4]. In *C. diemenicus* there is a similar projection. However, liquid oozes from any surface of the column after puncture and it does not appear to be nectar. It is probable that if nectar is present it serves as an enticement and a reward after the insect has entered the flower.

Flowers pollinated by flies are termed Myophilous. A separate division has been coined for those species which lure dipterans with scents of decaying materials or carrion. These are termed Sapromyophilous. An overall picture has been established for Sapromyophilous species[5], and it is probable from certain characteristics of *Corybas diemenicus* that it is a member of this group. These characteristics are:

I Flower inconspicuous.
II Colour dull or greenish, occasionally augmented by a brown-purple.
III No nectar-guides.
IV The presence of the peculiar openings or auricles at the base of the labellum.
V The presence of an entrapping mechanism on the labellum.

As in all orchids the labellum of *C. diemenicus* plays the dominating role in its pollination.

As the flower matures, relative movements of the labellum and dorsal sepal occur. At the time when the pollen and stigma are ripe, these organs are in a position to allow the entry of insects attracted to the flower.

At the base of the labellum the surface is convoluted to form two small auricles. These are sited so that they form a direct connection with the interior-base of the flower and the outside environment. Their role has been somewhat conjectural, but I am of the opinion that they are a direct aid to pollination. Firstly they probably allow some small amount of light to penetrate into the interior of a flower, which because of its shape and habitat, would be pretty gloomy. Secondly however, and this is probably the more important factor, it would allow some small air current to circulate. Such a current, no matter how small, would probably be of extreme importance in the diffusion of the attracting scent to the outside environment. It is perhaps significant that the two small glands are situated near the opening of the auricles.

A microscopic examination of the surface of the labellum reveals a

wonderful adaptation in the form of a well-hidden trap. On the throat at the point where the gradient becomes steepest, there are a series of cunningly-placed downward sloping teeth. These are quite round and slender and would offer no restriction to an insect moving forward, while they would tend to prevent it backing out easily once it reaches this point. By going forward, perhaps feeding on the nectar, and then using the column to manoeuvre, the insect could quite easily get out of the flower again, and perhaps in the process bring about pollination.

From some of these remarks we can see that along with many of our orchids, the dour little *Corybas diemenicus* has developed quite a remarkable pollination relationship, although observations suggest it may not be as effective as some.

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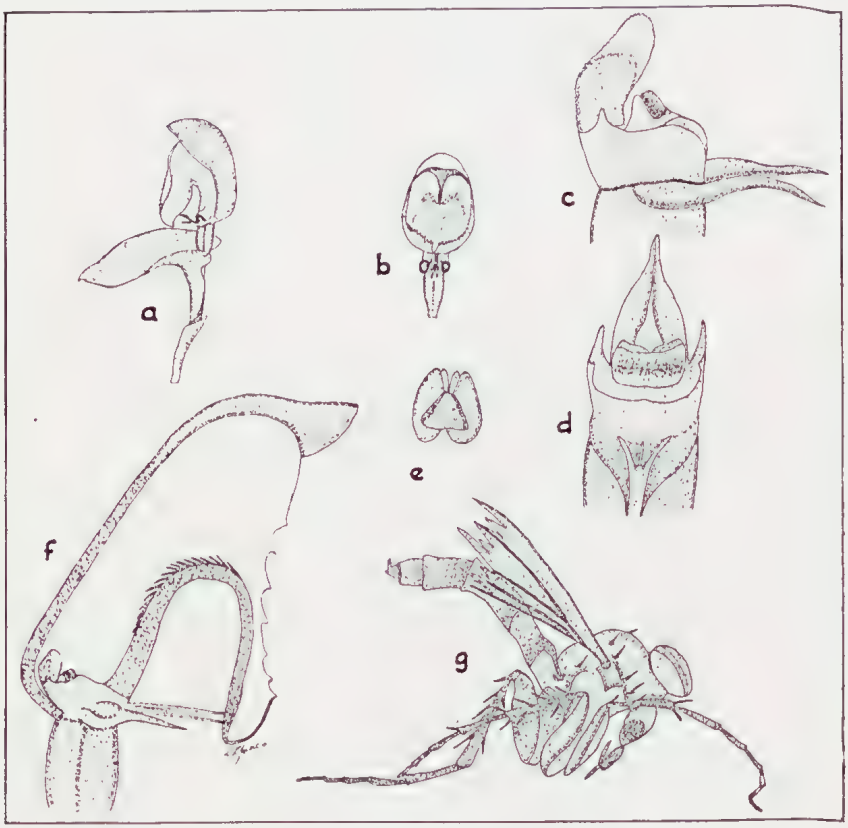

Fig. 1

(a) Plant from side (1½ x).
(b) Flower from front (1½ x).
(c) Column and lateral sepals from side (40 x).
(d) Column, lateral petals and sepals from front (40 x).
(e) Pollinarium (40 x).
(f) Section of Flower (6 x).
(g) Pollinating agent showing attachment of pollinarium (25 x).

book review

The Wild Flowers of the Wilson's Promontory National Park

Published by Thomas C. Lothian Pty. Ltd. in conjunction with the Field Naturalists Club of Victoria.

Size 8¾" x 5¾", stiff cover, vii + 220 pp., with glossary and index. Five well-known wildflower photographers (Dr. G. N. Christensen, Mrs. Ilma Dunn, Miss Betty Terrell, Mrs. J. R. Garnet and the late H. T. Reeves) have added to the charm and usefulness of the illustrations by contributing their superb photographs for the preparation of the 9 colour plates and 32 half-tone illustrations. These, with the author's line drawings, make possible the easy identification of more than one quarter of the 740 native species of fern and flowering plant recorded as inhabiting the National Park.

In conformity with the pattern established in his earlier book on the Vegetation of Wyperfeld National Park, the author has recorded the known flora of the Promontory in the form of check-lists. In this book he has extended the range beyond the vascular flora to include mosses, lichens, liverworts, fungi and marine and freshwater algs.

The check-lists are something more than mere catalogues of species. Together with the general text they provide fascinating glimpses into the past history of the Promontory.

The Field Naturalists Club of Victoria is proud to be associated with the publishing of this attractive volume, not only because the author is one of its members, its one-time honorary secretary and, on two occasions, its President but, because the Club itself played an active part in bringing about the establishment of this famous national park. Members of the Club have been responsible for much of its recorded natural history and this book brings together under one cover the combined results of their botanical contributions.

Don't for a moment think that the book is designed exclusively for botanists and those with some special interest in wildflowers. It is written for the pleasure and enjoyment of any one of the 90,000 people who visited the Park last year and any one of the thousands who will visit it this year and in future years.

Even those who can't endure the sight of wildflowers will enjoy reading what the author has to say about the "Prom."

About the author: The striking dust jacket gives a brief biographical sketch of the author and Who's Who in Australia adds to it by mentioning that one of his recreations is "going bush". To all this we need scarcely add that his talent for botanical illustration is displayed to advantage in this present book — which is a tribute to both the illustrator and the process block maker.

F.N.C.V. PUBLICATIONS AVAILABLE FOR PURCHASE

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Field Naturalists Club of Victoria

The F.N.C.V. Council members and the Editor wish to extend the Compliments of the Season to all readers; and we also hope that 1971 offers the opportunity for the fulfilment of our ambitions.

General Meeting

9 November, 1970

The President, Mr. T. Sault, chaired the meeting and made welcome approximately 120 members and visitors, including some from the country.

Mr. Barry Cooper asked members to come forward and speak about their exhibits, a varied collection being tabled.

Exhibits:

Barry Cooper — Collection of Fossil Echinoids (Sea Urchins) from Vic. beaches.

S. Barker — Acacia galls (Scale insects).

N. E. Hall — Mahogany Gum leaves affected by filigree lerps (under microscope).

Mrs. E. King — *Banksia marginata, Sprengelia incarnata, Helichrysum* spp. Mountain pepper (*Drimys lanceolata*), distorted Manuka trunk (*Leptospermum juniperinum*) from Tasmania.

Mrs. Jean Zirkler — Mealy Bug (Lerp insect).

Miss Doery — Wiry Bauera (*B. rubioides*), Pinnate Boronia (*B. pinnata*) Large-leafed Grevillea (*G. barkleyana*), Blue Dampiera (*D. stricta*). Collected by Native Plants Preservation Society on areas being bulldozed at Labertouche.

Mrs. W. Seamons — Tufted Blue Lily (*Stypandra caespitosa*) Melaleuca (*M. decussata*).

Mr. I. Hammett — False Wattle (*Calicoma seratifolia*), *Olearia* spp. from Kinglake area, Lemon Bottle-brush (*Callistemon pallidus*), *Melaleuca* (*M. Filifolia*), Spiny Tea-tree (*Letospermum spinescens*).

Mr. A. J. Swaby — A collection of mosses and miniature plants.

Mr. T. Sault — Rushes and Sedges and pond life under microscope.

Mr. K. Strong — Gall insect hatched from specimen shown by Mr. Cameron at previous meeting.

Also tabled were the dustjacket of "Wildflowers of Wilson's Promontory" by J. Ros Garnet available at Christmas and a poster concerning the proposed site of the Natural History Museum — is it to be used for other purposes?

The presentation of the Natural History Medallion to Miss Jean Galbraith, was made by Mr. R. T. M. Pescott who said that Miss Galbraith was most deserving of the award. The Medallion is awarded to people of merit in the Natural History field and Miss Galbraith was most ably qualified by her excellent ability as a writer and lecturer, being the author of numerous articles and several books, notably "Garden in a Valley" and "Wildflowers of Victoria". Miss Galbraith on accepting the Medallion paid a tribute to all those people who had helped to widen her knowledge of natural history. She had become a member of the F.N.C.V. in 1921 and had received much help and inspiration from members over the years.

Mr. T. Sault after thanking Mr. Pescott for presenting the award, presented Miss Galbraith with her Honorary Membership Certificate, much overdue, as she had been made an honorary member 11 years ago.

Mr. David Reeves of Riddells Creek, Secretary of the Macedon Range Conservation Society, issued an invitation to members to assist with a Koala survey to be conducted in the Macedon area on Nov. 22nd.

The Secretary announced that Mr. Rex Filson had been awarded a Churchill Scholarship enabling him to further his studies on lichens overseas.

A letter was received from Mr. L. K. Elmore with further information on the Mt. Napier National Park and enclosing maps of the area.

Mr. J. Baynes queried the new postage charges for the Vic. Naturalist. This was discussed by members and the President stated that this matter was being investigated by the Council.

Mr. G. Taylor drew members' attention to the continuing threat of alienation of the Westernport Bay areas by proposed development of heavy industries. There were also indications of further works by the C.R.B. in East Gippsland in areas which should be preserved. He appealed to members for vigilance on these matters.

It was with deep regret that the President announced the deaths of 3 club members. They were Mr. Ernest E. Lord, Miss Chisholm and Miss F. Bage. Members were also informed of the death of Mrs. N. E. Lewis, club subscription secretary for the past 2 years.

Mr. A. Fairhall paid a tribute to Mr. Lord, a past Treasurer and President of the Club. He was the author of "Trees and Shrubs for Aust. Gardens" and was the founder and first Editor of the magazine "Your Garden".

Mrs. Bennett, speaking of Miss Chisholm, said that she was a member since 1918 and had wide interests in natural history. She resided at Mt. Macedon until her recent transfer to the Alexandra Home at Castlemaine.

Mr. J. Baynes spoke of Miss Bage's long association with the club, being a member since 1904. She was a highly qualified and distinguished member.

Mr. D. Lee said that the death of Mrs. Lewis was a tragedy as she was a young and vivacious woman and had been a very efficient subscription secretary. Mr. D. McInness had taken over the books and Mr. D. Lee had withdrawn his resignation temporarily until other arrangements could be made.

Those members who visited Wyperfeld National Park earlier this year would be saddened to hear of the death of Mr. R. Campbell, park ranger, who was of great assistance to them during their stay.

Miss Jean Galbraith was guest speaker for the evening and her address was entitled "Enjoying Life". She spoke of her philosophy of life which could be understood and appreciated by all naturalists. Miss Galbraith said that there were many things that could be enjoyed in the study of flowers and their methods of pollination, the reasons for leaves being of different shapes and sizes, and the great complexities of plants of the same family. She also said that children should be introduced to natural history at an early age and an appreciation of nature ensured that they would be the conservationists of the future. Amongst plants there was intense competition as well as co-operation, but she had found it a restful world without pain and gave enjoyment to all who seek to know its many facets. We depend on plants for our daily bread and our daily ration of beauty.

Mr. Sault thanked Miss Galbraith for her stimulating and thought provoking talk, which was enjoyed by all present.

Botany Group Meeting

12 November, 1970

Miss Helen Aston spoke in her usual competent manner to the seventeen members and visitors present at the meeting. Her subject was "Botanical Terms". From the number of questions asked during Miss Aston's explanation of the list of common terms she had prepared for each member, it was obvious that her talk was much appreciated. She promised to come again some time next year to continue with the same subject.

There will be no Botany Group Excursion till next February.

Flowers and Plants of Victoria in Colour

Copies of this excellent book are still available, and of course would make a wonderful gift. They are obtainable from the F.N.C.V Treasurer, Mr. D. McInnes.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 December — At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Nature Notes and Exhibits.
3. Subject for the evening — "Museology 70": The Function and Role of Museums in Society—Mr. J. McNally, Director of Natl. Museum of Victoria.
4. New Members.

Ordinary:

Miss Dorothy M. Lyons, 17 Hotham St., Seddon, 3011. (Interest—Geology.)
Dr. G. R. Wagner, 24 Highfield Rd., Canterbury, 3126. (Interests—Botany and Geology.)
Mrs. Anne E. Macaulay, 2/12 Station St., E. Kew, 3102.
Mrs. Margaret A. Watts, 96 Ludstone St., Hampton, 3188. (Interests—Botany and Ornithology.)
Mr. Roger Martin, 2/619 Bourke Rd., Hawthorn E., 3123.
Miss Mary E. Foster, 15 Nyora St., East Malvern, 3145. (Interest—Marsupials.)
Miss Irene H. Stewart, 189 New St., Middle Brighton, 3186.
Mr. G. Y. Stringer, "Tulloch" Officer, 3809. (Interests—Botany and Horticulture.)
Mr. G. L. Rayment, 14 Benwerrin Road, Surrey Hills, 3127. (Interest—General.)
Mr. Gregory C. Thwaites, 21 Pakenham Road, Ashburton, 3147. (Interest—Wildlife.)

Joint:

Mr. Eric and Rowena Whiting, 10/107 Gordon St., Footscray, 3011. (Interests—Geology and Botany.)

Junior:

Miss Janet Webb, 72 Were St., Brighton, 3186.

Country:

Rev. A. Eames, Sacred Heart Presbytery, P.O. Box 61, Yea, 3717.

5. General Business.
6. Correspondence.

Monday, 11 January, 1971 — Members' Night.

GROUP MEETINGS

There will be no Group Meetings between the December and January General Meetings.

F.N.C.V. EXCURSIONS

Saturday, 26 December- Sunday, 3 January. Cann River. The coach will leave Flinders St. outside the Gas and Fuel Corporation at 8.30 a.m. Boxing Day. Bring a picnic lunch.

GEOLOGY GROUP EXCURSIONS

Sunday, 7 February — Maribyrnong River Terraces—upstream from railway bridge, Albion-Broadmeadows Line. Leader: Mr. D. McInnes.

Sunday, 14 March — To Bulla-Deep Creek Gorge. Transport by private car. Spare seats are usually available for those without their own transport. Excursions leave from the western end of Flinders Street Station, opposite the C.T.A. Building at 9.30 a.m.

No excursion is planned for January, 1971.

Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Marysville State Forest

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Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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